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AQUATIC DISPOSAL FIELD INVESTIGATIONS EATONS NECK DISPOSAL SITE--ETC(U)

SEP 77 R J VALENTI, S PETERS DACW51-75-C-0016

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T. R. D-77-6 AQUATIC DISPOSAL FIELD INVESTIGATIONS. EATONS NECK DISPOSAL SITE. LONG ISLAND SOUND

AD A045720

(12)

DREDGED MATERIAL RESEARCH PROGRAM

U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION

TECHNICAL REPORT D-77-6

(6)

AQUATIC DISPOSAL FIELD INVESTIGATIONS EATONS NECK DISPOSAL SITE LONG ISLAND SOUND.

APPENDIX D: PREDISPOSAL BASELINE CONDITIONS OF DEMERSAL FISH ASSEMBLAGES.

(12) 97p.

by

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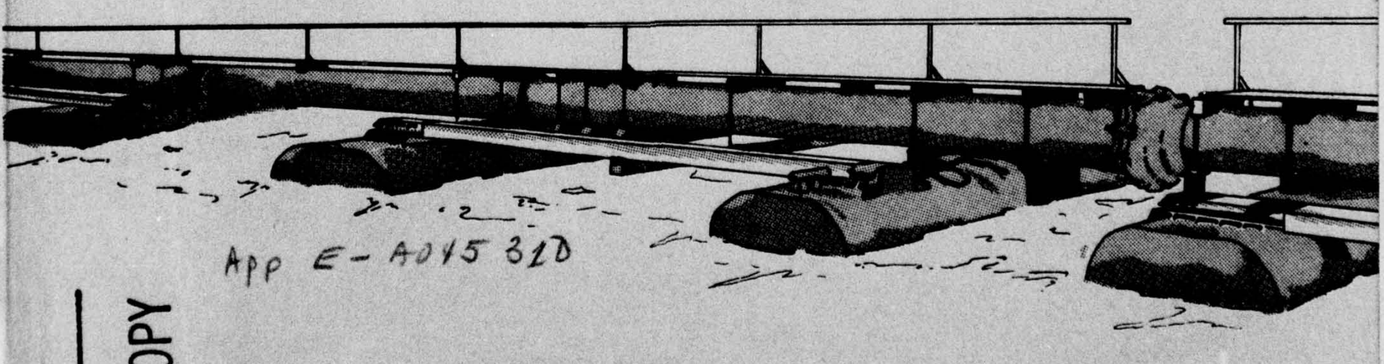
(18) WES

(19) TR-D-77-6

(11) Sep[redacted]77

(9) Final Report. Nov 74 - Jun 75,

Approved For Public Release; Distribution Unlimited



App E - A045 320

Prepared for Office, Chief of Engineers, U. S. Army
Washington, D. C. 20314

Under Contract No. (15) DACW51-75-C-0016
(DMRP Work Unit 1A06C)

Monitored by Environmental Effects Laboratory
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

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AQUATIC DISPOSAL FIELD INVESTIGATIONS
EATONS NECK DISPOSAL SITE
LONG ISLAND SOUND

Appendix A: Hydraulic Regime and Physical Characteristics of Bottom Sediment

Appendix B: Water-Quality Parameters and Physicochemical Sediment Parameters

Appendix C: Baseline Studies of Plankton, Nekton, and Benthic Invertebrate Populations

Appendix D: Predisposal Baseline Conditions of Demersal Fish Assemblages

Appendix E: Predisposal Baseline Conditions of Zooplankton Assemblages

Appendix F: Predisposal Baseline Conditions of Phytoplankton Assemblages

DEPARTMENT OF THE ARMY
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IN REPLY REFER TO: WESYV

2 September 1977

SUBJECT: Transmittal of Technical Report D-77-6 (Appendix D)

TO: All Report Recipients

1. The technical report transmitted herewith represents the results of one of several research efforts (Work Units) undertaken as part of Task 1A, Aquatic Disposal Field Investigations of the Corps of Engineers' Dredged Material Research Program. Task 1A is a part of the Environmental Impacts and Criteria Development Project (EICDP), which has as a general objective determination of the magnitude and extent of effects of disposal sites on organisms and the quality of surrounding water, and the rate, diversity, and extent such sites are recolonized by benthic flora and fauna. The study reported on herein was an integral part of a series of research contracts jointly developed to achieve the EICDP general objective at the Eatons Neck Disposal Site, one of five sites located in several geographical regions of the United States. Consequently, this report presents results and interpretations of but one of several closely interrelated efforts and should be used only in conjunction with the consideration of the other related reports for this site.

2. This report, Appendix D: Predisposal Baseline Condition of Demersal Fish Assemblages, is one of six contractor-prepared reports that are appended to the Waterways Experiment Station Technical Report D-77-6 entitled: Aquatic Disposal Field Investigations, Eatons Neck Disposal Site, Long Island Sound. The titles of the contractor-prepared appendices of this series are listed on the inside front cover of this report. The technical report provides additional results, interpretations, and conclusions not found in the individual contractor reports and provides a comprehensive summary and synthesis overview of the entire project.

3. The purpose of this report, conducted as Work Unit 1A06C, was to determine the baseline conditions of the benthic fish and shellfish at an established open-water disposal site off Eatons Neck, Long Island Sound, and compare these populations to surrounding areas where disposal had not occurred. This report concerns the demersal fish sampling data of select shellfish at the Eatons Neck disposal site covering the months from November 1974 to June 1975. The spatial and temporal distributions of the more abundant demersal fish are discussed. The food habits of eight benthic foraging fish species are also presented. Data on lobsters collected include monthly histograms denoting spatial and temporal distributions, male-female ratios, and relative abundance of exploitable legal-sized lobsters.

4. The conclusions of this report based on the data presented were that the Eatons Neck disposal site appears to be a valuable area with regard to fisheries resources and is also a prime lobstering area accounting for a significant portion of the total lobsters collected during the study period. Lobsters were apparently attracted to the site because of the past dumping activities and can be considered in selecting future dumping sites within the dumping grounds.

5. The baseline evaluations at all of the EICDP field sites were developed to determine the base or ambient physical, chemical, and biological conditions at the respective sites from which to determine impacts due to the subsequent disposal operations. Where the dump sites had historical usage, the long-term impacts of dumping at these sites could also be ascertained. Controlled disposal operations at the Eatons Neck site, however, did not occur due to local opposition to research activities and even though the Eatons Neck project was terminated after completion of the baseline, this information will be useful in evaluating the impacts of past disposal at this site. The results of this study are particularly important in determining placement of dredged material for open-water disposal. Referenced studies, as well as the ones summarized in this report, will aid in determining the optimum disposal conditions and site selection in relation to the commercial fishery of the historical dump site and surrounding areas.

JOHN L. CANNON
Colonel, Corps of Engineers
Commander and Director

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Technical Report D-77-6	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND, APPENDIX D: PREDISPOSAL BASELINE CONDITIONS OF DEMERSAL FISH ASSEMBLAGES		5. TYPE OF REPORT & PERIOD COVERED Final report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Dr. Robert J. Valenti Stephen Peters		8. CONTRACT OR GRANT NUMBER(s) Contract No. DACW51-75-C-0016
9. PERFORMING ORGANIZATION NAME AND ADDRESS New York Ocean Science Laboratory Montauk, New York		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS DMRP Work Unit 1A06C
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE September 1977 13. NUMBER OF PAGES 93
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) U. S. Army Engineer Waterways Experiment Station Environmental Effects Laboratory P. O. Box 631, Vicksburg, Mississippi 39180		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Benthic fauna	Field investigations	Waste water disposal
Disposal areas	Fisheries	Water quality
Dredged material disposal	Fishes	
Eatons Neck disposal site	Sampling	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The major goal of the Eatons Neck disposal site field investigation was to evaluate the effects of aquatic disposal of dredged material on organisms and water quality, including the significance of physical, chemical, and biological factors that influence the rate of disposal site recolonization by benthic animals. → next page

A comprehensive research program was planned and conducted at Eatons

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Unclassified

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20. ABSTRACT (Continued).

Neck in order to evaluate cause and effect relationships associated with the impact of open-water disposal.

This volume of the study presents demersal fish sampling data at Eatons Neck. The spatial and temporal distributions of the more abundant demersal fish are discussed. The food habits of eight benthic foraging fish species are also presented. Data on lobsters include monthly histograms denoting spatial and temporal distributions, male-female ratios, and relative abundance of exploitable legal-sized lobsters.

The report concludes that the Eatons Neck site is a valuable area with regard to fishery resources. Throughout the sampling, with few exceptions, the disposal site accounted for the largest catches of fish. The disposal site was also found to be a prime lobstering area and accounted for 91.3 percent of the total number of lobsters collected.

The study recommends that prime consideration be given to lobster fishery in any future disposal operations since it represents the most utilized resource of the area.

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CONTENTS

PREFACE

This report presents the results of an investigation to determine the baseline conditions of demersal fish assemblages at the Eatons Neck Disposal Site, Long Island Sound, New York. The investigation was conducted as part of the Dredged Material Research Program.

The study was prepared for the Office, Chief of Engineers, and supported by the U. S. Army Engineer Waterways Experiment Station (WES), Environmental Effects Laboratory (EEL), Vicksburg, Mississippi, under Contract No. DACW51-75-C-0016 to the New York Ocean Science Laboratory, Montauk, New York. Contracting was handled by the New York District (NYD); COL Thomas C. Hunter, CE, NYD, was Contracting Officer.

The report was written by Dr. Robert J. Valenti and Stephen Peters of the New York Ocean Science Laboratory. The following New York Ocean Science Laboratory personnel assisted in the collecting, sorting, and identification of the samples: Paul Broskus, Joby Hauer, Clarence Hickey, and James Zaborski.

The study was conducted under the direction of the following EEL personnel. The contract was managed by Mr. J.R. Reese, Environmental Monitoring and Assessment Branch, under the supervision of Mr. R.C. Solomon, Branch Chief, and Dr. C.J. Kirby, Chief, Environmental Resources Division. The study was under the general supervision of Dr. R.M. Engler, Environmental Impacts and Criteria Development Project Manager, and Dr. John Harrison,

Chief, EEL.

The Directors of WES during the conduct of the study and preparation of the report were COL G.H. Hilt, CE, and COL J.L. Cannon, CE. Technical Director was Mr. F.R. Brown.

CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	by	To Obtain
inches	0.0254	metres
feet	0.3048	metres
fathoms	1.8288	metres
cubic yards	0.7645549	cubic metres
knots (international)	0.5144444	kilometres per hour

AQUATIC DISPOSAL FIELD INVESTIGATIONS

EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND

APPENDIX D: PREDISPOSAL BASELINE CONDITIONS

OF DEMERSAL FISH ASSEMBLAGES

INTRODUCTION

1. The United States Army Corps of Engineers was authorized by Congress in the 1970 River and Harbor Act to initiate studies to provide information on the environmental impact of dredged material disposal. This study was conducted under contract with the Corps of Engineers to determine the baseline conditions of the benthic fish at an established open-water disposal site off Eatons Neck, Long Island Sound (Figure D1). This site was to be used in future experiments to determine the regional effects of dredged material disposal on the environment by studying the effects of several discrete disposal operations. The study began in November 1974 and was designed to follow the results of several disposal operations on different sediment types. However, as a result of local political opposition, a decision to discontinue the study was made by the Corps before the first year baseline study was completed. The study was cancelled and the last set of data were obtained in June 1974, 8 months after the study began.

2. The Eatons Neck Disposal Site was utilized for the disposal of dredged material from 1902 until March 1973. Records were first kept in 1954

and, since then, approximately 14 million cu yd* of dredged material has been discharged at the site. In addition, it served as the disposal site for the contents of 30 vessels (mostly barges) over 30 ft in length and for construction and demolition wastes. This report concerns the demersal fish sampling data at the Eatons Neck Disposal Site covering the months from November 1974 to June 1975. The spatial and temporal distributions of the more abundant demersal fish are discussed. The food habits of eight benthic foraging fish species are also presented. Data on lobsters collected include monthly histograms denoting spatial and temporal distributions, male-female ratios, and relative abundance of exploitable legal-sized lobsters.

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* A table of factors for converting U.S. customary to metric (SI) units of measurement can be found on page 4.

MATERIALS AND METHODOLOGY

3. Sampling of the demersal fish populations at the proposed Eatons Neck Disposal site was conducted monthly from November 1974 to June 1975 with the exception of March 1975 when no sampling took place due to bad weather conditions and technical problems with the sampling vessel. An early April sampling (2 April 1975) was scheduled in place of the March sampling. Due to additional problems with the vessel, the sampling was not completed until mid-April.

4. Four stations were initially selected for sampling (Figure D2):

Station	Latitude	Longitude
EF1	41° 00' 37"	73° 27' 55"
EF2	41° 01' 07"	73° 26' 40"
EF3	40° 59' 53"	73° 21' 58"
EF4	40° 59' 40"	73° 27' 35"

5. Since the contract called for sampling only three stations, one station, EF2, was sampled in November and December and then deleted because the presence of fixed commercial lobster gear in the area made trawling impossible. Station EF3 was utilized as a control station and as such was not within the boundaries of the disposal site. The stations were sampled using a standard semiballoon otter trawl with a 30-ft head rope (Figure D3). The only modification was a fine mesh cod end-liner to retain small fish. Mesh configuration was as follows: body, 2-in. stretched mesh (s.m.) #15 twine; cod end, 1-1.5 in. s.m.; and cod-end liner,5-in. s.m. The foot rope was fitted with 10 ft of 0.25-in. gal-

vanized chain with the remainder being 3/16-in. galvanized chain. Five-ft solid bracket doors were used with 12-ft warps. This equipment is similar to that used by commercial fishermen, except that it is smaller and has a smaller mesh. The smaller mesh size was chosen so that juvenile fish, which would have passed through a standard commercial trawl, would be collected.

6. All tows were made parallel to each isobath at 2.0-2.5 knots. Occasionally tows had to be terminated prior to the allotted 15 minutes due to a rough bottom or fixed commercial lobster traps. In those cases one or more replicate tows were made such that the mean value of all tows was equal to 15 minutes. In considering abundance, mean values were used; however, total numbers of fish collected are also included. Bathythermograms were made before each tow, using a Belfort Instrument Co. bathythermograph. Surface temperatures were taken coincident with each bathythermogram; bottom salinities were measured before and after each tow, with the reported value being the mean of the two observed values. A 5-liter Niskin bottle was used to collect the water samples, which were analyzed with a Beckman induction salinometer. Data collected on physical variables included bottom temperature, bottom salinity, and depth.

7. All fish collected were preserved in a 10-percent formalin solution. A maximum of 15 specimens per species per station were used to obtain abundance and predation parameters. Lobsters that were collected while

trawling were enumerated and the carapace length and sex recorded. After a short recovery period, the lobsters were returned to the water at the same station as they were collected.

RESULTS AND DISCUSSIONS

Physical Variables

8. The data for bottom temperature and salinity at each station are given in Table D1 along with the sampling depths. Figure D4 shows the temperature-salinity relationship versus time for each station.

Demersal Fish

9. Limitations of study. The data included in this report are based on an 8-month survey that did not include the summer season because the study was terminated for the reason given in paragraph 1. Therefore, complete representation of the seasonal and geographical abundance, the total number of species, and the food habits of demersal fish cannot be presented.

10. Primary categories. Three categories of fish occur in Long Island Sound. The resident population lives year round and breeds in the Sound. Some of these species undergo a seasonal migration within the Sound. These fish comprised the bulk of those sampled, which are enumerated in Table D2. The regular visitors are fish who visit the Sound during predictable intervals. Some of these fish may come to spawn or may just pass through in the course of their seasonal migrations. These fish were collected infrequently; many of them are listed in Table D3. The occasional visitors are mainly tropical and warm-water species. These fish wander from the Gulf Stream, through which they travel, and are usually found only during the late summer.

11. Transitory populations. In Long Island Sound, the period from July through October is important because a wide range of salinities and temperatures exists and, therefore, there are large transitory fish populations in the Sound at that time. Of the demersal fish species off the Northport area, the more abundant ones are summer migrants from the Middle Atlantic or the outer continental shelf.[1] If the sampling at Eatons Neck had continued for a full year or longer, many of the infrequently collected species might have been collected in greater numbers. Included in the more abundant summer species taken at Northport, N.Y., by Austin et al.[1] were menhaden (*Brevoortia tyrannus*), bay anchovy (*Anchoa mitchilli*), scup (*Stenotomus chrysops*), butterfish (*Peprilus triacanthus*), weakfish (*Cynoscion regalis*), summer flounder (*Paralichthys dentatus*), and striped searobin (*Prionotus evolans*).[1]

12. Abundance of species. During the 8-month sampling period, a total of 5489 fish, comprised of 37 different species, were collected (Table D2). Replicate tows were made at selected stations.* Because of these replicate tows, mean values are used in the discussion on abundance. Twenty-three species of fish (Table D3) were collected fewer than ten times throughout the sampling period and are not included in abundance discussions. The three most abundant species caught were windowpane

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*Replicate tows: Station EF1 - three 7 November 1974
Station EF3 - three 23 December 1974; two 2 April 1975.

flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), and red hake (*Urophycis chuss*). Due to their high abundance, they are discussed separately and in more detail than [illegible] the other species.

13. Major species. According to Bigelow and Schroeder, windowpane flounders exhibit no inshore-offshore seasonal migration.[2] Thus the windowpane flounder is a permanent resident of Long Island Sound, where they are quite common. A consistently abundant catch of windowpane flounders was made during the study with the exception of November (Table D4). Windowpane flounders appear to be more abundant at the disposal site stations during the winter months, with a gradual shift in abundance to the control station in the spring (Figure D5).

14. The winter flounder is also a permanent resident of Long Island Sound where it spawns. Bigelow and Schroeder refer to the winter flounder as a stationary species;[2] however, during the summer months it undergoes a seasonal migration to deeper, cooler waters. This migration is reflected by the data, which show abundance increasing to a peak in late December and early January and then declining with the warming of the water in spring. Winter flounders were more abundant at the disposal site stations than at the control station during the winter. In spring, however, there was a shift in relative abundance to the control station (Figure D6). It should be noted that no significant difference exists in the water depths at the disposal site as opposed to the control station.

15. According to Thomson et al., red hake are migratory.[3] The adults come inshore and into the eastern end of Long Island Sound during the late spring and early summer to spawn. This fact is substantiated by the data in this study, which show the greatest catches of red hake occurring in June with an additional small peak in April. The youngest fish, those up to 2 yr of age, are probably a resident population. Red hake appear to be equally abundant at all stations, except in June, when they were more abundant at the control station (Figure D7). Red hake apparently move from the area in May since none were caught during this month.

16. Windowpane flounders, winter flounders, and red hake comprised 54.2, 26.0, and 7.8 percent of the mean total catch, respectively. Combined, they represented 88.0 percent of the total catch. The peak catches for these three species occurred during the following months: windowpane flounder (N = 414) during early and mid-April; winter flounder (N = 363) during January (during this month the winter flounder was the most abundant species at all stations); and red hake (N = 221) during June.

17. When observing the three stations individually, it was found that trawls at EF1 resulted in the largest catches with 1808 fish collected during the 8-month sampling period. Windowpane flounder, winter flounder, and red hake comprised 89.2 percent of the total number of fish caught at this station. Station EF3, the control station, had the second highest catch with a total of 1493 fish (Table D5). Windowpane flounders, winter flounders, and red hake comprised 68.7 percent of the total at station

EF3. The smallest number of fish collected were at EF4, which had a total catch of 1128 (Table D5). This lower catch is partly due to the fact that EF4 was not included as one of the original stations and sampling did not begin until December.

18. Other species. Tautog (*Tautoga onitis*) inhabit rocky or rough substrates; consequently they are probably more abundant in the area than sampling indicated. Such an area of abundance might be the abandoned station, EF2, which was found to be too rough for trawling. Bigelow and Schroeder report that tautog tend to become reclusive during the months from November through April and, although present, are not usually observed or caught.[2]

19. The cunner (*Tautogolabrus adspersus*) shows a marked preference for the disposal site. Like tautog, the cunner inhabits a hard or rocky substrate. The cunner appears to reach its peak abundance in this area in late winter and spring.[1]

20. Finkelstein reported that scup (*Stenotomus chrysops*) are seasonal inhabitants, moving in from the edge of the continental shelf off Maryland and North Carolina through the eastern end of Long Island Sound during spring.[4] However, in these samplings, scup were caught in November and December only, after which the scup catch stopped. Thomson et al. reported that although most scup move south with the rapid autumnal cooling, there is a resident population that winters off the coast of southern New England.[3] Austin et al.[1] found that

scup are abundant off the Northport area from June to October, which is not concurrent with this study's sampling period.

21. According to Bigelow and Schroeder, the fourbeard rockling (*Enchelyopus cimbrius*) is a permanent resident wherever it is found.[2] They have been reported to occur in Long Island Sound, in depths of 5.5 to 9 fathoms and to inhabit a soft muddy bottom such as those sampled in this study.[3] The species first appeared regularly in samples taken during April, although a single fish was caught in February. Generally, fourbeard rockling became more abundant toward summer with the peak occurring in June, the final sample. They appear to be slightly more abundant at the disposal site as compared with the control station. The data indicate a movement out of the area during the winter. Austin et al. reported collecting adult rockling in Long Island Sound off the Northport coast during summer and fall.[1]

22. The silver hake (*Merluccius bilinearis*) exhibit marked population movements with a wide tolerance of depth.[2] They were caught throughout the 8-month sampling period. Peak abundance occurred during June, with a smaller peak during December and January. Silver hake were more abundant at the control station than at the disposal site during peak periods, but were equally abundant during the remainder of the sampling. Richards collected silver hake in Long Island Sound throughout the year.[5]

23. The common searobin (*Prionotus carolinus*) and the striped searobin (*Prionotus evolans*) are discussed together since they occur simultaneously in this area. The common searobin was only caught at the control station, while the striped searobin was collected at all stations. The data are not sufficient, however, to make abundance comparisons between stations. Peak abundance for both species was in November. Thomson et al. reported an inshore migration in late spring and an offshore migration in the fall.[3] This migration was reflected by this study since no searobins were caught between December and June. Austin et al. reported that searobins in Long Island Sound were off the Northport coast from June until October.[1]

24. The fourspotted flounder (*Paralicthys oblongus*) is reported as being numerous along the New York coast, although it inhabits deeper water than that of the sampled area.[2] They were first collected in November and were not caught again until late April; peak abundance occurred in June. It appears from the data that the fourspotted flounder moves from the area during the winter. Austin et al. reported a similar decrease in Long Island Sound.[1] The literature gives no indication whether or not a migration takes place.

25. Butterfish (*Peprilus triacanthus*) were only collected in November. They are normally midwater-surface feeders, but there is evidence that in Long Island Sound they become demersal with the autumnal cooling.[3] Normally, the highly migratory butterfish spends the winter on the

continental shelf, enters Long Island Sound in the early spring to spawn, and returns offshore in the fall.[2]

26. Alewife (*Alosa pseudoharengus*) were caught from December through April. Insufficient numbers were collected to determine any difference between stations. They are anadromous and in early spring return to their parent freshwater or brackish water streams to spawn.[1] Adult alewife occur in Long Island Sound off the Northport area during spring, summer, and December and juveniles are taken in the spring and fall.[1]

27. The ocean pout (*Macrozoarces americanus*) is a permanent resident of Long Island Sound; the adults show a seasonal movement between deeper (winter) and shallower (spring) waters.[3] In this study, they were collected from December to April with insufficient numbers being caught to determine any seasonal or spatial abundance patterns. In Long Island Sound off of Shoreham, N.Y., ocean pout were taken in April and May of 1973 and 1974.[6]

28. Weight of catches. The weights of demersal fish catches, shown in Table D6, are presented with mean values used for species at stations where replicate tows were made, with the exception of station EF3 in February (paragraph 6). The weights are represented over the total sampling period per species per month per station. The weight contribution of windowpane and winter flounders, the two most abundant species, to the total catch is also included.

29. The total mean weight of fish from all stations over the 8-month sampling

period was 475.311 kg. The largest catch weight for a single month, 80.69 kg, was obtained during the January sample (Table D6).

30. Considering the three stations individually shows that station EF1 accounted for 37 percent of the total weight of fish caught. The largest catch (32.49 kg) at station EF1 occurred in January (Table D6). The largest catch obtained from the control station (EF3) was 42.15 kg in June 1975. This is the largest weight landed for any station throughout the sampling period. April and November had the next largest catches at this station resulting in a yield of 39.0 percent of the total catch. Sampling at station EF4 resulted in the smallest landings with a total contribution of 23.5 percent of the total catch. This station had the smallest catches, but it must be kept in mind that only seven monthly samplings were done there. The largest single monthly catch for station EF4 was during February with 22.35 kg.

31. Since windowpane flounder and winter flounder comprised such high percentages of the total catch, their contributions to the total weight is also expectably high (Table D4). In May the weight of windowpanes was 81.3 percent of the monthly sum and in the beginning and end of April was 67.7 and 72.6 percent, respectively. Winter flounder contributed 49.4 percent of the total weight in January and 29.6 and 26.6 percent in February and December, respectively. When the percentages of windowpane and winter flounders are combined for the month of January, these two fish comprised 94.94 percent of the total catch weight. If

the catches of these two species are again combined for the months of February and March, they result in 93.5 and 90.45 percent of the total catch weights, respectively.

32. Food habits. The stomach contents of eight species of benthic foraging fish were analyzed: scup (*Stenotomus chrysops*); tautog (*Tautoga onitis*); cunner (*Tautogolabrus adspersus*); common searobin (*Prionotus carolinus*); striped searobin (*Prionotus evolans*); longhorn sculpin (*Myoxocephalus octodecemspinosus*); windowpane flounder (*Scophthalmus aquosus*); and winter flounder (*Pseudopleuronectes americanus*). Whenever possible, 15 fish were preserved from each station per sampling and stomach contents were analyzed for each individual.

33. The scup is a carnivore, feeding primarily on invertebrates (Figure D8). Of those fish caught at the control station, the diet was comprised almost exclusively of various polychaetes. Stomachs excised from those fish caught at the disposal site contained 40 percent digested material. The bulk of the food items found in these stomachs consisted of polychaetes and pelecypods. The remaining 1.6 percent of the diet noted as "other" consisted of *Ampelisca vadorum, Neomysis americana,* Gammaridae, and Corophiedae. Major food items were reported as polychaetes, brachyurans, and bivalves. In a study done in Long Island Sound off the Long Island Lighting Company power plant at Northport, scup were found to have a varied diet of bivalves, polychaetes, amphipods, copepods, mysids, and decapods.[1] In another study done in the Long Island Sound off of

Shoreham, the diet of scup was reported as being 71 percent bivalves.[7]

34. The diet of tautog was found to consist mostly of the pelecypod *Mulinia lateralis* and brachyurans (Figure D9). The only tautog examined from the control station had digested stomach contents making it impossible to compare the disposal site with the control station with respect to the diet of this species. There was, however, a large percent occurrence of empty stomachs in fish caught at the stations at the disposal site area. Findings of this study contrast with a study done off Shoreham in which the bulk of the diet was found to be *Cancer* sp. and *Ensis directus* during 1974 and consisted primarily of *Spisula* sp. during 1973.[8] At Jamesport in 1973-74, the diet of tautog consisted of nearly equal parts of *Spisula, Balanus,* and brachyurans.[9] Austin et al. reported that tautog captured off Northport fed predominantly on bivalves and decapods.[1]

35. Cunners are omnivores and, according to Bigelow and Schroeder, are considered a second or third trophic level consumer.[2] As in the case of tautog, the diet of the cunner consisted largely of *Mulinia lateralis,* with other bivalves making up another large percentage (Figure D10). The remainder of the diet included assorted polychaetes, brachyurans, hydrozoans, *Nucula proxima, Nassarius* sp., *Pagurus* sp., caprellids, and shell fragments. The greatest percentage of empty stomachs were observed in those fish caught at the disposal site. Austin et al. reported that cunner collected off Northport fed primarily on bivalves, amphipods,

and decapods.[1] These data are generally in agreement with this study. The diet of cunners collected off Shoreham consisted of brachyurans, bivalves, and amphipods.[10] Cunners collected off Jamesport showed a preference for *Pagurus* sp. during the spring, pelecypoda during the summer, and *Cancer* sp. during the fall.[11] This diversity of diet suggests that the cunner will feed on any available benthic dwellers and can be considered an opportunistic feeder.

36. The diet of the common searobin consisted primarily of the mysid shrimp *Neomysis americana*. Other large percentages of the diet included *Crangon septemspinosa* and various polychaetes. The remaining 1.7 percent of the diet was composed of brachyurans, *Pagurus* sp. and *Nassarius* sp. (Figure D11). (Since the percentage of empty stomachs was low, it indicates that the species is a selective feeder and an abundant supply of *Neomysis* would be expected). These data agree with other studies done at Northport in 1973[1] and Shoreham and Jamesport in 1973-74.[12,13]

37. The diet of the striped searobin consisted primarily of *Crangon septemspinosa* with a smaller amount of *Neomysis americana* (Figure D12), just the reverse of the common searobin. The remainder of the diet was composed of *Cancer irroratus*, various pelecypods including *Tellina* sp., and assorted crustacea. As compared with the disposal site, a much greater percentage of empty stomachs were observed in those fish caught at the control station. This study's data are in agreement with Austin et al., who reported that the diet of striped searobins caught off

Northport consisted of *Crangon* sp., *Neomysis* sp., and *Cancer* sp.[1] At Shoreham the bulk of the striped searobin's diet consisted of brachyurans, with *Crangon* sp. and *Neomysis* sp. forming only a small segment.[14] Striped searobins caught off Jamesport were reported to have fed primarily on *Crangon* sp. and *Neomysis* sp.[15]

38. The diet of the longhorn sculpin was observed to be largely comprised of *Squilla* sp. and *Cancer irroratus* (Figure D13). The remaining portion of the diet consisted of brachyurans including xanthidae, Portunidae, *Ammodytes americanus, Crangon septemspinosa,* fish, and Pectinidae. It is interesting to note that while the diet of sculpins collected at stations EF1 and EF3 was almost exclusively *Squilla* sp., it was absent from the stomachs of sculpins collected at EF4. At this station the diet was mainly *Cancer* sp. and other types of crab. Austin et al. reported that the longhorn sculpin appears to be an aggressive demersal carnivore.[1] The diet of sculpins collected off Northport was found to be exclusively *Crangon* in the spring, *Cancer* sp. and *Homarus americanus* during the summer, and juveniles of its own kind during the winter.[1] Sculpins caught off Shoreham and Jamesport fed primarily on *Cancer* sp. and *Crangon* sp.[16,17]

39. The windowpane flounder showed a fairly consistent diet of *Neomysis americana* (Figure D14). Although it was a minor factor in the total, *Crangon septemspinosa* was the dominant food item at some stations during certain samplings. The 0.9 percent remainder of the food items included

unidentified fish, *Ammodytes americanus, Nepthys incisa, Pagurus* sp., *Tellina* sp., and small fragments of stone. These data are in agreement with studies done at Shoreham which report that the dominant food items of windowpane were *Neomysis* sp. and *Crangon* sp.[18] Austin et al. reported that for windowpane flounders collected off Northport, *Neomysis* sp. was the dominant food item, never occupying less than 35 percent of the total.[1] Bigelow and Schroeder,[2] Richards,[5] de Sylva et al.,[19] and Amish[20] all found *Neomysis* sp. to be the dominant food item. The percentage of empty stomachs was higher during the winter months. Benthic data collected at Eatons Neck confirm this, showing a much higher abundance of *Neomysis* sp. during spring and summer.

40. The winter flounder may be described as a scavenger with regard to its food habits, unlike the windowpane flounder which was found to be a highly selective feeder. Of all the species examined, the winter flounder had by far the most diversified diet (Figure D15). The bulk of the winter flounder's diet consisted of *Anemone* spp. and the polychaete *Pherusa affinis*. Of those fish collected at the control station, the percent occurrence of *Anemone* spp. was much higher than *P. affinis*, while in those fish from the disposal site the incidence of *P. affinis* was slightly higher than that of *Anemone* spp. The remainder of their diet included polychaetes, molluscs, and crustaceans, among other things. Polychaetes found in flounder stomachs include: *Nereis virens, Nepthys incisa, Glycera americana,* Maldanidae, *Axiothella cantenata, Pectinaria gouldii, Sabellaria vulgaris,* and Ampharetidae. The molluscs eaten by

the winter flounder with the exception of the gastropod *Nassarius* sp. were all bivalves such as *Nucula proxima, Yoldia limatula, Gemma gemma, Mya arenaria, Mulinia lateralis, Spisula solidissima,* and *Lyonsia hyalina.* Crustacea found in flounder stomachs included mainly amphipods such as *Ampelisca vadorum, Leptecheirus pinguis,* unidentified Corophiidae, *Unciola irrorata,* and *Gammarus* sp. Other crustaceans included Xanthidae, *Pinnotheres maculatus,* and other inidentified brachyurans. Other items eaten by the winter flounder were *Companularia* sp. and other unidentified Hydrozoa, Nemertea, Echinodermata, algae, and rock fragments.

41. During the winter months of January and February, the percent occurrence of empty stomachs in winter flounder was very high, while in April and May very few empty stomachs were found. This is most likely due to the winter flounder's reproductive cycle which takes place during the peak of winter. Breeder states that winter flounder, among other species, refrain from eating during the spawning season.[21] As compared with the control station, empty stomachs were observed more frequently in winter flounder collected at the disposal site stations. The degree of diversity exhibited by the winter flounder's diet suggests that they are opportunisitic with regard to their food habits.

42. Throughout the sampling, fish were found with empty stomachs. At certain times of the year, for some species, the incidence of this condition was unusually high. The probable reasons for this are several and varied. The most obvious explanation, that of collecting nocturnal feeders during the day, is not likely in this sampling. Those species included

in the food habits section may all be described as diurnal feeders.[2] There are a number of other factors to which empty stomachs can be attributed. As previously mentioned, the winter flounder is expected to have a high level of empty stomachs during the spawning season. A torpid condition due to a depressed water temperature may also be responsible for the presence of empty stomachs in fish. Olla et al. reported that the tautog and the cunner assume this lethargic state during the winter and will very rarely feed at water temperatures less than 6°C.[22] This is supported by the data on the cunner and the tautog. The availability of food is an important factor in assessing the causes of empty stomachs in the collected fish. A decrease in the temporal abundance of certain benthic fauna will similarly result in a decrease in food availability, which will in turn stimulate intraspecific and interspecific competition. During the winter samplings an increased number of empty stomachs were observed in windowpane flounder and northern searobin. This may be directly related to the decrease in the abundance of *Neomysis americana* which occurs simultaneously. Interspecific competition may also be the result of morphological differences between closely related species dependent on similar organisms for food. In the family Labridae for example, the cunner with his streamlined body, thin lips, and pointed snout, is better suited to foraging for motile crustaceans than is the tautog.[22]

Lobster

Eatons Neck area

43. Distribution. During the monthly trawling operations from November 1974 through June 1975, a total of 416 lobsters (*Homarus americanus*) were taken at all of the designated stations (Table D7).

44. Lobsters were also collected on a special cruise in June. All lobsters were sexed (December excepted), enumerated, and carapace lengths measured to the nearest millimetre. Histograms were constructed for lobster catches per station per month. The New York State legal commercial lobster's size is 81.0 mm; however, all lobsters to the right of the 80.0-mm line on the histograms are considered legal (Figures D16-D19).

45. Abundance. The largest catches of lobsters (pre-recruit and legal combined) were obtained in December and May, with a total of 71 for each month. The largest catch of lobsters in a single tow was during May at station EF4 with 46. It should be noted that this was only a 6-min tow. Following close behind was the late April sampling at the same station, with a catch of 44 lobsters (Figure D20).

46. When observing each station individually in relation to the total landings, it was found that station EF1 yielded 24.5 percent of the total catch, or 102 lobsters. Of this number 12.5 percent were of legal size and therefore exploitable. Station EF2, which was only sampled from November through February, accounted for 15.6 percent

of the total catch, 65 lobsters. The greatest number of legal-sized lobsters obtained from any station throughout the study were caught at EF2 in only 4 months. Sampling at this station was discontinued after February due to the presence of fixed commercial lobster gear. Sampling at station EF3, the control station, resulted in the poorest landings, with only 8.7 percent of the total catch, 36 lobsters. Throughout the study only a single legal-sized lobster was caught at this station. The largest number of lobsters caught at a particular station were obtained at EF4. This station contributed 51.2 percent of the total catch, 213 lobsters. Only 6.1 percent of the lobsters caught at EF4 were of legal size, however. This is a somewhat lower figure than was obtained from EF1 and EF2.

47. During sampling, six gravid or "berried" females were collected. These lobsters are indicated by a "B" at the appropriate carapace length on the histograms (Figures D16-D18). Five of the gravid lobsters were collecte during the two cruises in June. One of these lobsters is not found in the histograms because the carapace was cracked, hence the length was not recorded. The remaining lobsters were collected during January. All of the gravid lobsters collected had a carapace length greater than 76.0 mm.

48. Limitation. The Eatons Neck area of Long Island Sound supports a large commercial lobster fishery, with a high rate of exploitation. Full- and part-time lobstermen from both Long Island and Connecticut fish these waters making it difficult to estimate the relative abundance of lobsters.

In describing the abundance of demersal fish, this problem is not encountered, since other than lobstermen, not many commercial fishermen work this area. While some lobstering takes place year round, the fishing effort increases greatly in the spring and reaches its peak level during the summer. The intensity of commercial lobster fishing in the study area followed the same pattern as this study's lobster catch data. The station with the largest percentage of legal-sized lobsters, station EF2, had the most intense fishing effort. The relative abundance of lobster traps at each station was employed as an index to fishing effort. This was followed by stations EF1, EF4, and finally EF3, the effort exerted at the latter station being small as compared with the others. During May and June, the abundance of fixed commercial lobster gear was sufficient to cause some of the tows to be terminated before the alloted 15 min.

Eastern Long Island Sound

49. Location of study. Currently the New York Ocean Science Laboratory under contract from the National Marine Fisheries Service and the New York State Department of Environmental Conservation is conducting a lobster study in the eastern portion of Long Island Sound. Lobsters are collected from 29 stations ranging from Port Jefferson, N.Y., eastward to Horton Point. The stations are located on five transects that extend northerly almost to the Connecticut shoreline (Figure D21). The first year's data were obtained from sampling conducted during one cruise per month in the

following months: August and December 1974; and April, May, June, and July 1975. The same equipment, personnel, and methodology were employed as in the Eatons Neck study.

50. Abundance. During the six samplings, a total of 506 lobsters were collected.[23] While this is a greater catch than was obtained at Eatons Neck, it is also a much greater fishing effort. These results would seem to indicate a greater abundance at the Eatons Neck Disposal Site. The eastern Long Island Sound study encompasses productive as well as unproductive stations (mostly unproductive, which would account for a certain degree of the lowering of catch per unit effort).

51. The largest catch of lobster, in the eastern Long Island Sound study, occurred in December with 165 lobsters. May and April were second with 133 and 131 lobsters, respectively. These times of major abundance coincided with those of the Eatons Neck study. Peak abundance occurred during December in both cases which may be misleading. Since commercial lobstering activities are at a minimum at that time, there are probably more lobsters available for sampling. Toward the summer, as the lobster fishing increases, the abundance of lobsters decreases in both cases.

52. Male-to-female ratio. The male-to-female ratios of lobsters at Eatons Neck and eastern Long Island Sound were found to be 1:1.2 and 1:1.5, respectively. According to Herrick, the ratio should be 1:1, with any discrepancies probably due to collecting selectivity.[24]

53. Size. Throughout both studies in the Sound, pre-recruit lobsters or shorts, made up the majority of the catch. Comparing the two studies on the length frequency histogram (Figure D15), a similar pattern of carapace lengths is observed. The most abundant size of lobsters at Eatons Neck was in the 66- to 70-mm carapace length range, while the most abundant size of lobsters in eastern Long Island Sound was in the 56- to 60-mm range. There was, however, a greater number of legal-sized lobsters caught at the Eatons Neck area. The overall size range of lobsters collected at Eatons Neck Disposal Site was 18.8- to 90.4-mm carapace length. The overall range of carapace length in eastern Long Island Sound was found to be 20.8 to 102 mm.

CONCLUSIONS

54. The Eatons Neck Disposal Site appears to be a valuable area with regard to fishery resources. Throughout the sampling, with few exceptions, the disposal site accounted for the largest catches of fish. One of the disposal site stations was responsible for 37 percent of the total weight of fish collected. Commercially important species such as winter flounder, tautog, and silver hake ranged from equal to greater abundance at the disposal site as compared with the control station. Food habits differed occasionally between the disposal site and the control station. Winter flounder, the one commercial species on which data were readily available, were found to have a greater degree of diversity of diet at the disposal site as compared with the control station for the overall sampling period. The ratio of fish with empty stomachs at the disposal site to the control station varied with different species. Winter flounder were found in this condition more often at the disposal site than at the control station.

55. The disposal site is also a prime lobstering area and accounted for 91.3 percent of the total number of lobsters collected. Often the disposal site was so crowded with lobster traps that the 15-min tows had to be terminated early. This type of commercial fishing dominates the area since trawling and lobstering are in direct conflict. In any possible future disposal operations, prime consideration should be toward the lobster fishery, as it represents the most utilized resource of the area.

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Table D1

Mean Bottom Temperatures and Salinities at Times of Fish Sampling

Cruise Date	Station EF1			Station EF3			Station EF4		
	Depth m	Temperature C	Average Salinity °/°°	Depth m	Temperature C	Average Salinity °/°°	Depth m	Temperature C	Average Salinity °/°°
7 November 1974	38	14.3	27.833	25	14.1	28.223	- -	- -	- -
23 December 1974	23	6.3	27.661	26	6.1	27.772	28	6.2	27.685
22 January 1975	24	3.6	27.28	27	3.6	27.31	26	3.9	27.32
21 February 1975	24	2.6	27.101	26	2.4	27.127	28	2.6	27.13
2-15 April 1975	23	4.5	26.661	28	4.4	26.97	27	4.5	26.670
28 April 1975	25	6.4	26.625	27	6.3	26.674	30	6.2	26.625
14 May 1975	24	8.4	26.577	27	8.0	26.691	30	8.1	26.562
24 June 1975	25	12.6	26.979	30	12.2	27.170	30	12.8	26.952

Table D2

Number and Weight of Fish Species Collected

at Eatons Neck Disposal Site

Species	Total No. of Species	EF1-1		EF1-2		EF1-3		EF3		EF2	
		N	Wt, kg	N	Wt, kg	N	Wt, kg	N	Wt, kg	N	Wt, kg
		11 November 1974									
Scopthalmus aquosus	284	46	5.1	54	6.8	59	9.0	47	3.27	78	6.9
Stenotomus chrysops	40	5	0.27	4	0.23	6	0.45	4	0.374	21	1.958
Pseudepleuronectes americanus	14	1	0.029	1	0.031	3	0.153	7	0.503	2	0.295
Prionotus evolans	38	11	3.37	6	0.90	14	4.9	2	0.046	5	0.706
Prionotus carolinus	26	0	- -	0	- -	0	- -	14	0.226	12	0.184
Peprilus triacanthus	61	60	2.7	1	1.60	0	- -	0	- -	0	- -
Mustelus canis	2	1	2.7	1	0.45	0	- -	0	- -	0	- -
Squalus acanthias	16	4	8.55	2	0.9	4	15.3	0	- -	6	20.7
Tautoga onitis	7	1	0.339	1	2.7	1	3.1	0	- -	4	4.0
Pomatomus saltatrix	4	0	- -	3	0.217	0	- -	1	0.148	0	- -
Cynocion regalis	14	3	0.201	7	0.157	3	0.402	0	- -	1	0.004
Merluccius bilinearis	5	2	0.084	1	0.04	2	0.105	0	- -	0	- -
Tautogolabrus adspersus	10	3	0.310	1	0.076	3	0.280	2	0.059	1	0.100
Paralichthys oblongus	21	1	0.042	1	0.005	2	0.078	10	0.582	7	0.268
Vomer setapinnis	2	2	0.062	0	- -	0	- -	0	- -	0	- -
Alosa pseudoharengus	1	0	- -	0	- -	1	0.057	0	- -	0	- -
Urophycis sp.	49	0	- -	0	- -	0	- -	0	- -	49	12.6
Total No. of Fish Collected	594	140		83		98		87		186	
Total Weight	126.555	23.757		14.106		33.825		5.208		47.715	

(continued)

Table D2 (continued)

23 December 1974

Species	Total No. of Species	EF1 N	EF1 Wt, kg	EF2 N	EF2 Wt, kg	EF3-1 N	EF3-1 Wt, kg	EF3-2 N	EF3-2 Wt, kg	EF3-3 N	EF3-3 Wt, kg	EF4 N	EF4 Wt, kg
Scopthalmus aquosus	575	105	14.9	130	15.6	77	7.7	55	6.35	73	10.9	135	10.16
Stenotomus chrysops	27	6	0.117	6	0.138	12	0.271	1	0.016	2	0.320		
Pseudopleuronectes americanus	384	231	10.0(N=84)	17	1.4	45	6.91	23	4.80	41	8.618	27	3.69
Prionotus evolans	15		0.061			2	0.055	4	0.051	3	0.047	3	0.05
Prionotus carolinus	3					2	0.034	1	0.02				
Peprilus triacanthus	2			1	0.002	1	0.037						
Mustelus canis	0												
Squalus acanthias	0												
Tautoga onitis	10			5	0.419							5	0.93
Pomatomus saltatrix	0												
Cynocion regalis	1									1	0.032		
Merluccius bilinearis	72	2	0.132	16	3.5	23	3.7	20	2.14	10	2.062	1	0.14
Tautogolabrus adspersus	34	1	0.155	17	0.882	4	0.025	4	0.018			8	0.51
Paralichthys oblongus	1									1	0.008		
Vomer setapinnis	0												
Alosa pseudoharengus	13	2	0.082	10	0.343	1	0.081						
Urophycis sp.	21			10	0.721					11	0.194		
Alosa aestivalis	1	1	0.024									3	0.070
Urophycis chuss	65	1	0.102			61	1.01					1	0.31
Myoxocephalus octodecemspinosus	6	1	0.401	3	1.033			1	0.26				
Trinectes maculatus	1			1	0.163								
Raja erinacea	5					3	1.510			2	1.423		
Paralichthys dentatus	1					1	0.009						
Centropristis striata	4					1	0.004	2	0.022	1	0.008		
Menidia menidia	1					1	0.003						
Brevoortia tyrannus	3					3	0.140						
Hemitripterus americanus	1											1	0.37
Macrozoarces americanus	1											1	0.22
Myosocephalus aeneus	1											1	0.009
Total No. of Fish Collected	1248	350		216		237		111		145		186	
Total Weight	125.502		25.974		24,201		21.489		13.677		23.621		16.459

(continued)

Table D2 (continued)

22 January 1975

Species	Total No. of Species	EFL N	EFL Wt, kg	EF2 N	EF2 Wt, kg	EF3 N	EF3 Wt, kg	EF4 N	EF4 Wt, kg
Pseudopleuronectes americanus	580	190	12.360	217	10.900	54	14.535	119	12.880
Scopthalmus aquosus	507	164	18.696	188	44.320	73	9.030	82	8.895
Urophycis chuss	49	5	0.030	1	0.040	4	0.044	2	0.020
Tautogolabrus adspersus	21	20	0.737	-	- -	-	- -	1	0.035
Merluccius bilinearis	20	2	0.040	4	0.030	11	0.130	3	0.035
Alosa pseudoharengus	13	6	0.150	1	0.040	4	0.044	2	0.020
Menidia menidia	6	4	0.010	-	- -	2	0.007	-	- -
Macrozoarces americanus	4	1	0.225	1	0.040	1	0.135	1	0.080
Myoxocephalus aeneus	3	1	0.020	2	0.020	-	- -	-	- -
Raja erinacea	2	-	- -	1	0.005	2	1.010	-	- -
Clupea harengus	2	1	0.150	-	- -	1	0.154	-	- -
Myoxocephalus octodecemspinosus	2	-	- -	1	0.360	1	0.340	-	- -
Tautoga onitis	1	1	0.050	-	- -	-	- -	-	- -
Osmerus mordax	1	1	0.020	-	- -	-	- -	-	- -
Myoxocephalus scorpius	1	-	- -	1	0.095	-	- -	-	- -
Anchoa mitchilli	1	-	- -	1	0.005	2	1.010	-	- -
Alosa aestivalis	1	-	- -	1	0.003	-	- -	-	- -
Urophycis regius	1	-	- -	1	0.019	-	- -	1	0.010
Total No. of Fish Collected	1216	396		434		168		218	
Total Weight	137.411		32.488		56.942		25.646		22.335

(continued)

Table D2 (continued)

21 February 1975

Species	Total No. of Species	EF1 N	EF1 Wt, kg	EF2 N	EF2 Wt, kg	EF3-2 N	EF3-2 Wt, kg	EF4 N	EF4 Wt, kg
Scopthalmus aquosus	321	147	18.355	9	0.670	48	3.940	117	13.670
Pseudopleuronectes americanus	291	165	7.620	2	0.020	25	1.740	99	7.400
Tautogolabrus adspersus	10	-	- -	2	0.040	-	- -	8	0.440
Urophycis chuss	6	5	0.051	-	- -	1	0.010	-	- -
Macrozoarces americanus	8	7	1.694	-	- -	-	- -	1	0.050
Merluccius bilinearis	7	4	0.130	-	- -	3	0.020	-	- -
Clupea harengus	3	1	0.210	-	- -	-	- -	2	0.440
Tautoga onitis	3	-	- -	1	0.020	1	0.320	1	0.020
Alosa pseudoharengus	2	2	0.016	-	- -	-	- -	-	- -
Enchelyopus cimbrius	2	-	- -	1	0.070	-	- -	1	0.070
Osmerus mordax	2	1	0.037	1	0.050	-	- -	-	- -
Myoxocephalus octodecimspinosus	1	-	- -	-	- -	-	- -	1	0.260
Menidia menidia	4	1	0.005	-	- -	3	0.020	-	- -
Myoxocephalus aenus	1	1	0.012	-	- -	-	- -	-	- -
Total No. of Fish Collected	661	334		16		81		230	
Total Weight	57.65		28.13		1.05		6.12		22.35

(continued)

Table D2 (continued)

2-15 April 1975

Species	Total No. of Species	EF1 N	EF1 Wt, kg	EF3-1 N	EF3-1 Wt, kg	EF3-2 N	EF3-2 Wt, kg	EF4 N	EF4 Wt, kg
Scopthalmus aquosus	548	161	13.524	153	17.769	116	14,061	118	9.339
Pseudopleuronectes americanus	157	32	3.263	59	8.808	56	9.016	10	0.938
Urophycis chuss	92	36	0.615	38	0.675	17	0.230	1	0.048
Enchelyopus cimbrius	18	7	0.388	4	0.342	1	0.066	6	0.400
Tautogolabrus adspersus	17	8	0.371	-	- -	-	- -	9	0.318
Alosa pseudoharengus	9	3	0.037	6	0.077	-	- -	-	- -
Macrozoarces americanus	9	2	0.361	3	0.280	-	- -	4	0.625
Merluccius bilinearis	6	6	0.057	-	- -	-	- -	-	- -
Myoxocephalus octodecemspinosus	4	-	- -	1	0.213	1	0.678	2	0.678
Myoxocephalus aeneus	3	3	0.117	-	- -	-	- -	-	- -
Alosa aestivalis	2	-	- -	2	0.014	-	- -	-	- -
Tautoga onitis	2	2	0.091	-	- -	-	- -	-	- -
Clupea harengus	1	1	0.252	-	- -	-	- -	-	- -
Microgadus tomcod	1	-	- -	1	0.066	-	- -	-	- -
Total No. of Fish Collected	869	261		267		191		150	
Total Weight	83.350		19.076		28.244		23.684		12.346

(continued)

Table D2 (continued)

28 April 1975

Species	Total No. of Species	EF1		EF3		EF4	
		N	Wt, kg	N	Wt, kg	N	Wt, kg
Scopthalmus aquosus	337	26	2.785	207	22.121	104	9.936
Pseudopleuronectes americanus	37	2	0.159	15	2.302	20	1.381
Tautogolabrus adspersus	34	2	0.197	1	0.100	31	0.746
Enchelyopus cimbrius	19	-	- -	2	0.127	17	0.889
Urophycis chuss	17	2	0.069	3	0.103	12	0.217
Tautoga onitis	8	2	0.684	-	- -	6	3.321
Macrozoarces americanus	6	-	- -	6	0.515	-	- -
Merluccius bilinearis	3	-	- -	-	- -	3	0.029
Raja erinacea	2	-	- -	1	0.640	1	0.703
Myoxocephalus octodecimspinosus	2	1	0.243	1	0.331	-	- -
Alosa aestivalis	1	1	0.051	-	- -	-	- -
Paralicthys oblongus	1	-	- -	1	0.278	-	- -
Trinectes maculatus	1	-	- -	-	- -	1	0.055
Total No. of Fish Collected	468	36		237		195	
Total Weight	47.980		4.187		26.517		17.277

(continued)

Table D2 (continued)

14 May 1975

Species	Total No. of Species	EF1 N	EF1 Wt, kg	EF3 N	EF3 Wt, kg	EF4 N	EF4 Wt, kg
Scopthalmus aquosus	312	132	14.473	91	12.321	89	11.811
Enchelyopus cimbrius	28	7	0.407	9	0.475	12	0.888
Pseudopleuronectes americanus	27	3	0.204	20	3.040	4	0.458
Tautogolabrus adspersus	15	15	0.871	-	- -	-	- -
Paralichthys oblongus	8	1	0.310	6	0.910	1	0.232
Merluccius bilinearis	7	-	- -	-	- -	-	- -
Urophycis chuss	4	-	- -	-	- -	-	- -
Raja erinacea	2	-	- -	-	- -	-	- -
Macrozoarces americanus	1	-	- -	-	- -	1	0.179
Tautoga onitis	1	-	- -	1	0.421	-	- -
Scomber scombrus	1	-	- -	-	- -	1	0.406
Total No. of Fish Collected	401	158		134		109	
Total Weight	47.478		16.265		17.227		13.986

(continued)

Table D2 (concluded)

24 June 1975

Species	Total No. of Species	EF1		EF3		EF4	
		N	Wt, kg	N	Wt, kg	N	Wt, kg
Scopthalmus aquosus	283	102	13.473	145	20.676	36	3.880
Urophycis chuss	221	50	3.569	155	7.183	16	0.900
Merluccius bilinearis	41	7	0.662	32	4.195	2	0.452
Pseudopleuronectes americanus	37	2	0.250	35	4.981	-	- -
Enchelyopus cimbrius	32	14	0.958	12	0.542	7	0.378
Paralichthys oblongus	20	6	0.958	9	1.885	5	0.804
Prionotus evolans	7	2	0.922	4	1.637	1	0.432
Raja erinacea	2	-	- -	2	1.011	-	- -
Stenotomus chrysops	1	-	- -	1	0.018	-	- -
Tautoga onitis	1	-	- -	-	- -	1	0.145
Tautogolabrus adspersus	1	-	- -	1	0.017	-	- -
Total No. of Fish Collected	646	183		396		67	
Total Weight	69.928		20.792		42.145		6.991

Table D3

List of Species Collected Fewer than Ten Times During the November 1974 through June 1975 Sampling Period

Scientific Name	Common Name
Mustelus canis	smooth dogfish
Squalus acanthias	spiny dogfish
Raja erinacea	little skate
Alosa aestivalis	blueback herring
Brevoortia tyrannus	Atlantic menhaden
Clupea harengus harengus	Atlantic herring
Anchoa mitchilli	bay anchovy
Osmerus mordax	rainbow smelt
Microgadus tomcod	Atlantic tomcod
Urophycis regius	spotted hake
Menidia menidia	Atlantic silverside
Centropristis striata	black sea bass
Pomatomus saltatrix	bluefish
Vomer setapinnis	Atlantic moonfish
Cynoscion regalis	weakfish
Scomber scombrus	Atlantic mackerel
Hemitripterus americanus	sea raven
Myoxocephalus aenaeus	grubby
Myoxocephalus octodecemspinosus	longhorn sculpin
Myoxocephalus scorpius	shorthorn sculpin
Paralicthys dentatus	summer flounder
Trinectes maculatus	hogchoker
Monacanthus hispidus	planehead filefish

Table D4

Mean Total Weight and Percent of Total Catch

of *Scopthalmus aquosus* and *Pseudopleuronectes americanus*,

November 1974 through June 1975

Month	Mean Total Weight kg	Percent of Total
	Scopthalmus aquosus	
November	12.050	21.80
December	34.400	57.33
January	36.621	45.51
February	35.965	63.54
March *	38.792	67.70
April	34.842	72.61
May	38.605	81.31
June	38.029	54.38
	....	
	Pseudopleuronectes americanus	
November	0.469	0.85
December	15.963	26.60
January	39.775	49.43
February	16.760	29.61
March *	13.113	22.85
April	3.842	8.01
May	3.702	7.80
June	5.230	7.48

* Sampled in mid-April.

Table D5

Mean Species Abundance by Stations

Species	Nov	Dec	Jan	Feb	Mar*	Apr	May	Jun	Total
		Station EF1							
Scopthalmus aquosus (windowpane flounder)	53	105	164	147	161	26	132	102	890
Stenotomus chrysops (scup)	5	6	0	0	0	0	0	0	11
Prionotus evolans (striped searobin)	10	3	0	0	0	0	0	2	15
Peprilus triacanthus (butterfish)	35	0	0	0	0	0	0	0	35
Tautoga onitis (tautog)	1	0	1	0	2	0	0	0	4
Tautogolabrus adspersus (cunner)	2	1	20	0	8	2	15	0	48
Pseudopleuronectes americanus (winter flounder)	2	231	190	165	32	2	3	2	627
Paralicthys oblongus (fourspot flounder)	1	0	0	0	0	0	1	6	8
Merluccius bilinearis (silver hake)	2	2	2	4	6	0	0	7	23
Alosa pseudoharengus (alewife)	0	2	6	2	3	0	0	0	13
Urophycis chuss (red hake)	0	0	5	5	36	2	0	50	96
Enchelyopus cimbrius (fourbeard rockling)	0	0	0	0	7	0	7	14	28
Macrozoarces americanus (ocean pout)	0	0	1	7	2	0	0	0	10
									1808

(continued)

*Sampled in mid-April

Table D5 (concluded)

Species	Nov	Dec	Jan	Feb	Mar*	Apr	May	Jun	Total
	Station EF3								
Scopthalmus aquosus (windowpane flounder)	63	68	73	48	135	207	91	145	830
Stenotomus chrysops (scup)	13	5	0	0	0	0	0	1	19
Prionotus evolans (striped searobin)	4	3	0	0	0	0	0	4	11
Prionotus carolinus (common searobin)	13	1	0	0	0	0	0	0	14
Peprilus triacanthus (butterfish)	6	0	0	0	0	0	0	0	6
Tautoga onitis (tautog)	2	0	0	1	0	0	1	0	4
Tautogolabros adspersus (cunner)	1	3	0	0	0	1	0	1	6
Pseudopleuronectes americanus (winter flounder)	5	36	54	25	58	15	20	35	248
Paralicthys oblongus (fourspot flounder)	9	0	0	0	0	1	6	9	25
Merluccius bilinearis (silver hake)	0	18	11	3	0	0	0	32	64
Alosa pseudoharengus (alewife)	0	0	4	0	3	0	0	0	12
Urophycis chuss (red hake)	24	4	4	1	28	3	0	155	219
Enchelyopus cimbrius (fourbeard rockling)	0	0	0	0	3	2	9	12	26
Macrozoarces americanus (ocean pout)	0	0	1	0	2	6	0	0	9
									1493
	Station EF4								
Scopthalmus aquosus (windowpane flounder)	N	135	82	117	118	104	89	36	681
Prionotus evolans (striped searobin)	O	3	0	0	0	0	0	1	4
Tautoga onitis (tautog)	T	5	0	1	0	6	0	1	13
Tautogolabros adspersus (cunner)		1	1	8	9	31	0	0	50
Pseudopleuronectes americanus (winter flounder)	S	27	119	99	10	20	4	0	279
Paralicthys oblongus (fourspot flounder)	A	0	0	0	0	0	1	5	6
Merluccius bilinearis (silver hake)	M	0	3	0	0	3	0	2	8
Alosa pseudoharengus (alewife)	P	0	2	0	4	0	0	0	6
Urophycis chuss (red hake)	L	3	2	0	1	12	0	16	34
Enchelyopus cimbrius (fourbeard rockling)	E	0	0	1	6	17	12	7	43
Macrozoarces americanus (ocean pout)	D	1	1	1	0	0	1	0	4
									1128

* Sampled in mid-April.

Table D6

Mean Total Weight of Fish Species

Caught at Eatons Neck Disposal Site,

November 1974 through June 1975

Month	Total Weight kg	EF1	EF3	EF4
Nov	55.279	28.316	26.316	-
Dec	60.190	26.523	17.208	16.459
Jan	80.469	32.488	25.646	22.335
Feb	56.600	28.130	6.120	22.350
Mar*	57.386	19.076	25.517	12.346
Apr	47.981	4.187	26.517	17.277
May	47.478	16.265	17.227	13.986
Jun	69.928	20.792	42.145	6.991
Total Year's Weight	475.311	175.777	186.696	111.744
Percentage		37.0	39.0	23.5

*Sampled on 2 April

Table D7

Summary of Lobster Collection Data

Eatons Neck Disposal Site

Station	EF1	EF2	EF3	EF4	Total
November 1974					
Number of Females	0	5	10	N.S.	15
Number of Males	0	3	5	N.S.	8
Number of Legal Size	0	3	0	N.S.	3
Percent of Legal Size	0	37.5	0.0	N.S.	13.0
Total Number	0	8	15	N.S.*	23
Carapace Range: 33.2 mm - 86.3 mm x = 59.75 mm					
December 1974					
Number of Females	-	-	-	-	-
Number of Males	-	-	-	-	-
Number of Legal Size	5	12	0	2	19
Percent of Legal Size	45.5	36.4	0.0	8.0	25.7
Total Number	11	33	5	25	74
Carapace Range: 40.3 mm - 91.3 mm x = 65.8 mm					
January 1975					
Number of Females	8	17	1	14	40
Number of Males	5	6	1	11	23
Number of Legal Size	3	4	0	4	11
Percent of Legal Size	23.1	17.7	0.0	16.0	17.5
Total Number	13	23	2	25	63
Carapace Range: 45.7 mm - 87.6 mm x = 66.6 mm					
February 1975					
Number of Females	5	1	0	19	25
Number of Males	4	0	1	13	18
Number of Legal Size	0	0	1	1	2
Percent of Legal Size	0.0	0.0	100.0	3.1	4.7
Total Number	9	1	1	32	43
Carapace Range: 40 mm - 90 mm x = 65 mm					

* N.S. = Not sampled.

Table D7 (continued)

Station	EF1	EF2	EF3	EF4	Total
		2 April 1975			
Number of Females*	1	N.S.	0	19	20
Number of Males*	3	N.S.	1	14	18
Number of Legal Size	1	N.S.	0	2	3
Percent of Legal Size	11.1	N.S.	0.0	6.1	6.98
Total Number	9	N.S.	1	33	43
Carapace Range: 18.8 mm - 90.4 mm x = 61.6 mm					
		28 April 1975			
Number of Females	1	N.S.	0	28	29
Number of Males	1	N.S.	1	16	18
Number of Legal Size	0	N.S.	0	1	1
Percent of Legal Size	0.0	N.S.	0.0	2.3	2.1
Total Number	2	N.S.	1	44	47
Carapace Range: 29.3 mm - 80.6 mm x = 59.1 mm					
		May 1975			
Number of Females	13	N.S.	1	24	38
Number of Males	10	N.S.	3	22	35
Number of Legal Size	0	N.S.	0	2	2
Percent of Legal Size	0.0	N.S.	0.0	4.3	2.7
Total Number	23	N.S.	4	46**	73
Carapace Range: 32.6 mm - 88.9 mm x = 54.7 mm					
		2 June 1975 (special cruise)			
Number of Females	10	N.S.	1	1	12
Number of Males	22	N.S.	5	0	27
Number of Legal Size	0	N.S.	0	0	0
Percent of Legal Size	0.0	N.S.	0.0	0.0	0.0
Total Number	32	N.S.	6	1***	39
Carapace Range: 43.4 mm - 80.0 mm x - 63.1 mm					
		24 June 1975			
Number of Females	0	N.S.	1	4	5
Number of Males	3	N.S.	0	3	6
Number of Legal Size	0	N.S.	0	1	1
Percent of Legal Size	0.0	N.S.	0.0	14.0	9.0
Total Number	3	N.S.	1	7****	11
Carapace Range: 51.0 mm - 84.5 mm x = 70.2 mm					

* 5 lobsters not sexed

** 6-minute tow

*** The lobster taken at EF4 was a gravid female; however, no carapace length was recorded.

**** 7-minute tow

Table D7 (concluded)

Station	EF1	EF2	EF3	EF4	Total
Total: November 1974 - June 1975					
Number of Females	38	23	14	109	184
Number of Males	48	9	17	79	153
Number of Legal Size	9	19	1	13	42
Percent of Legal Size	12.5	29.2	2.8	6.1	10.1
Total Number	102	65	36	213	416

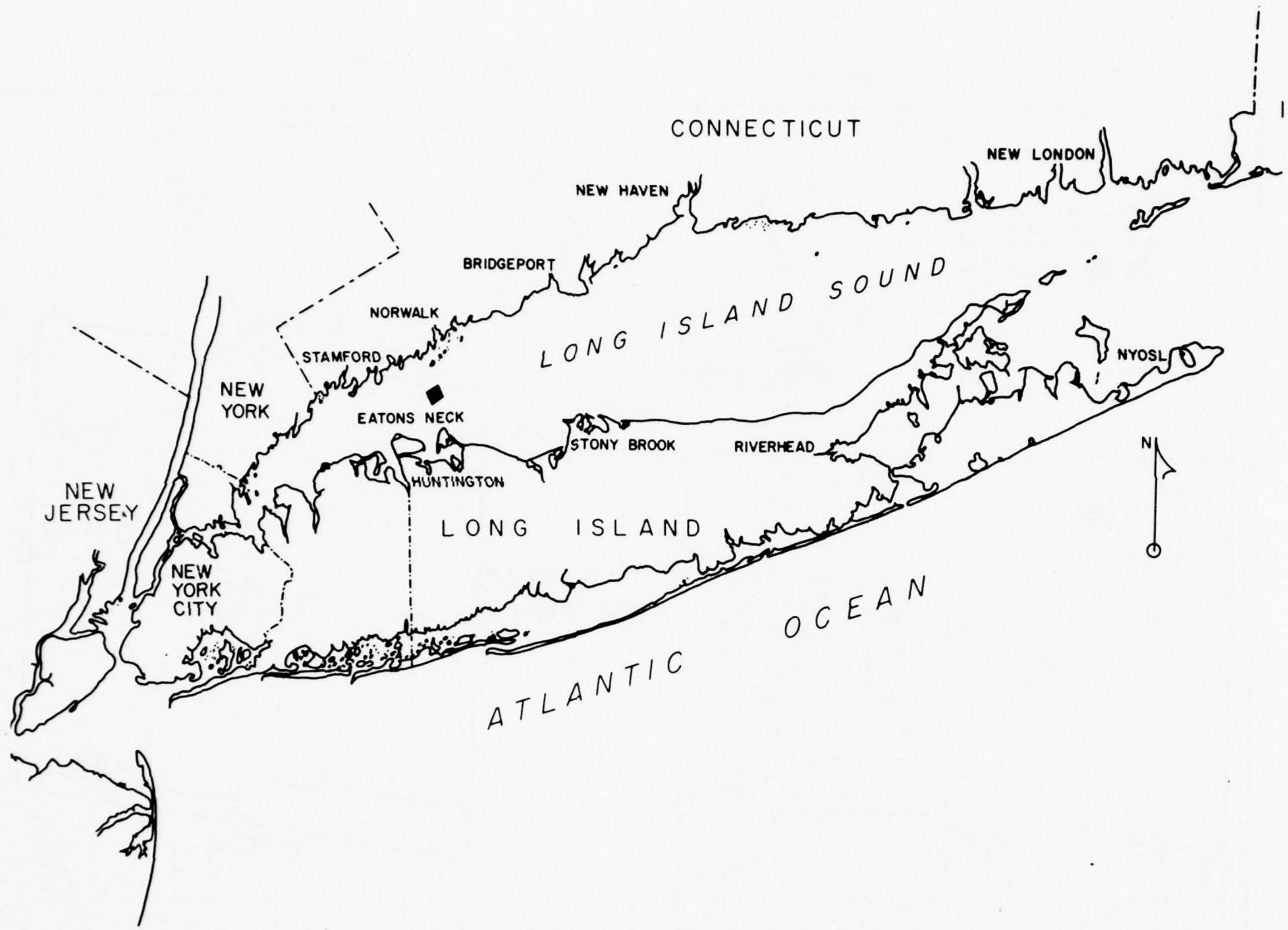


Figure D1. Location of the Eatons Neck Disposal Site in relation to major geographical features

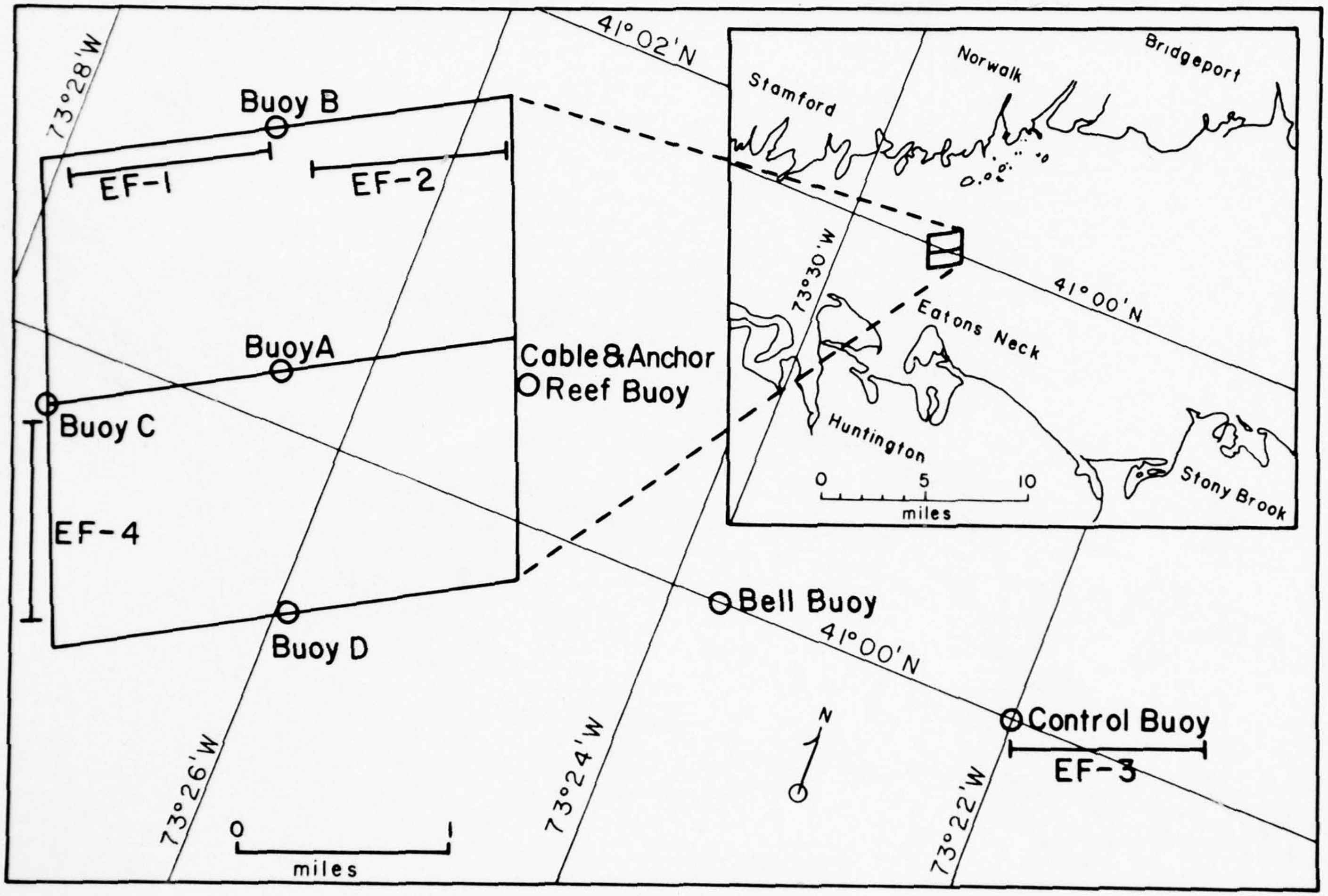


Figure D2. Station locations at Eatons Neck

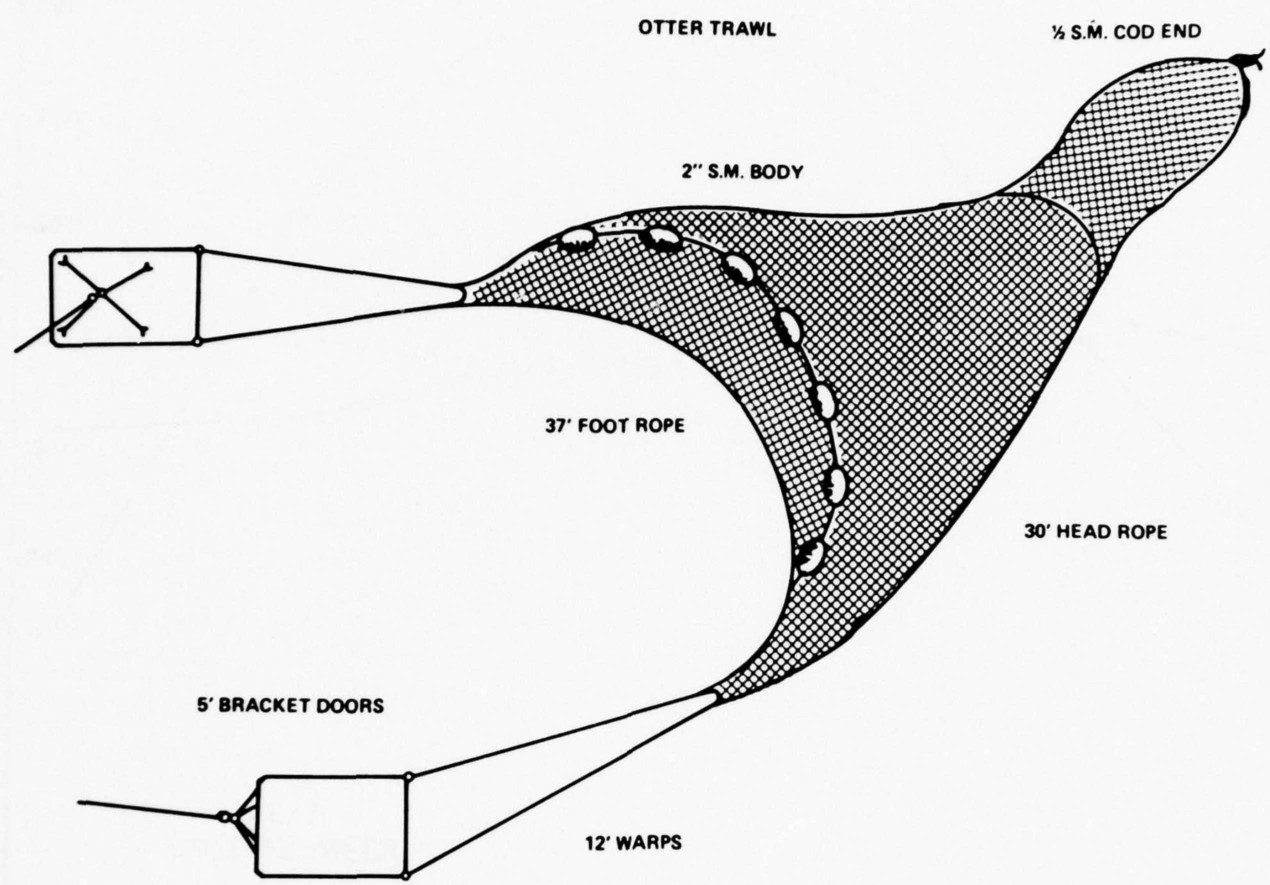


Figure D3. Diagram of otter trawl

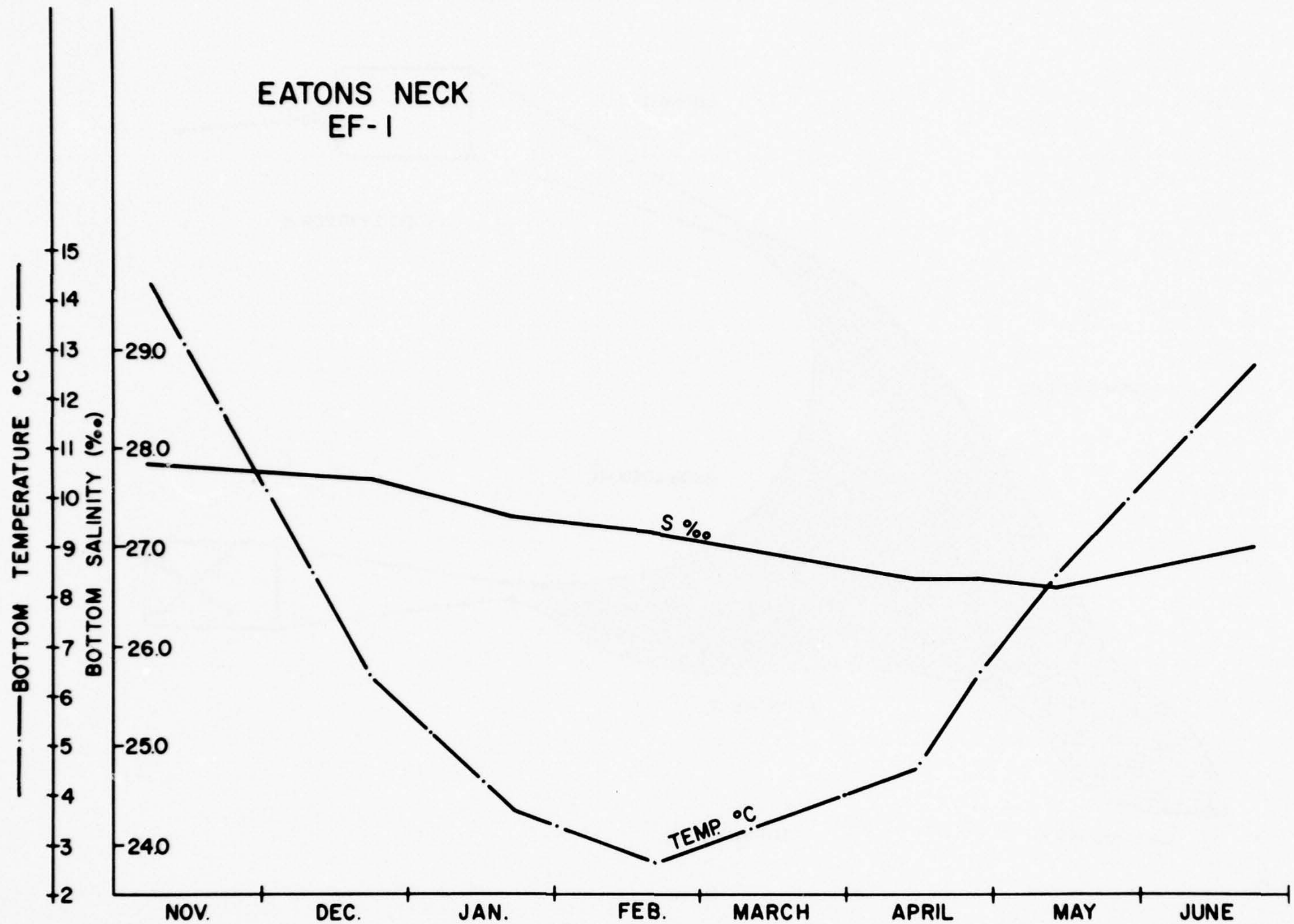


Figure D4. Monthly bottom temperatures and salinities of stations at Eatons Neck

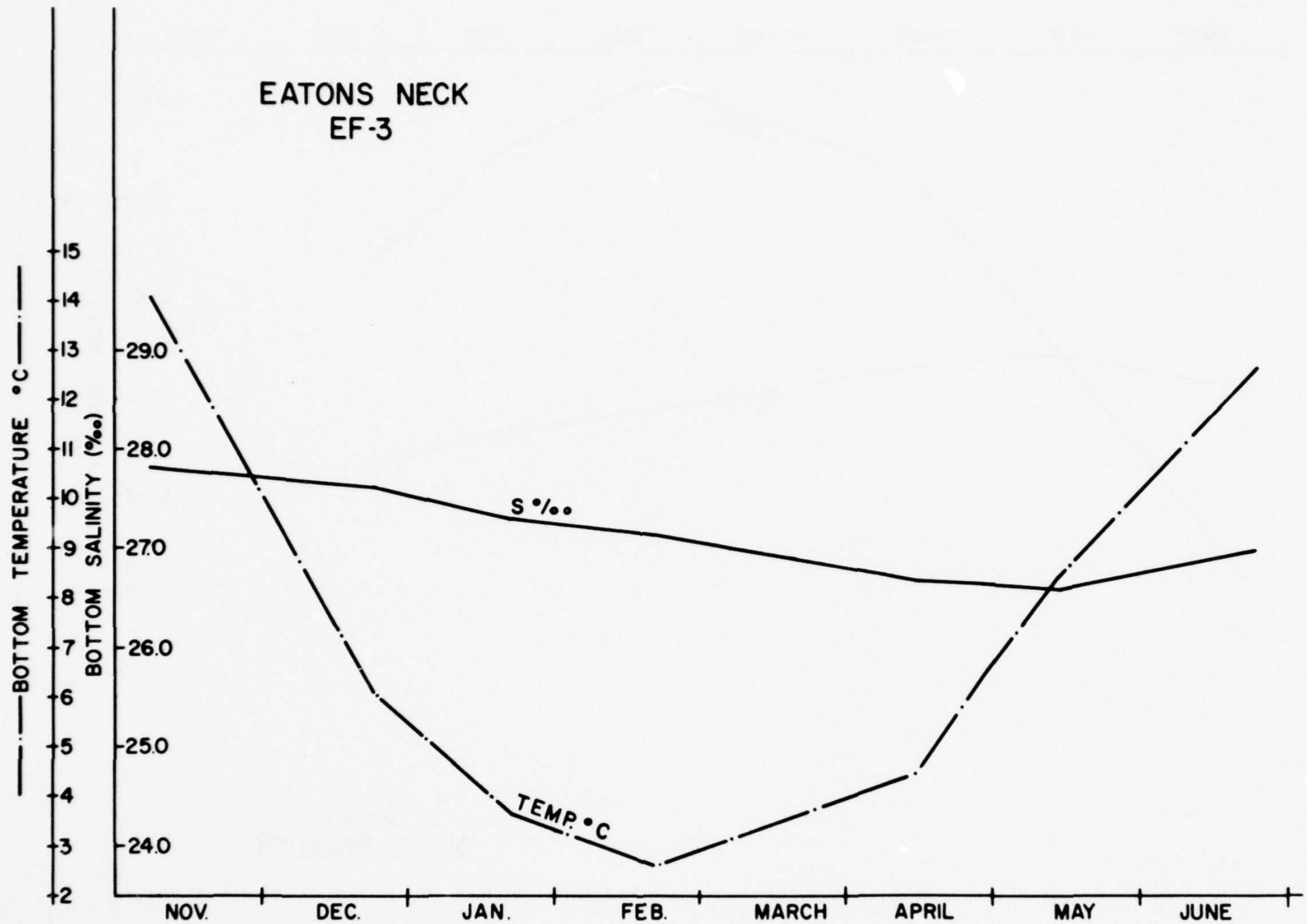


Figure D4 (continued). Monthly bottom temperatures and salinities of stations at Eatons Neck

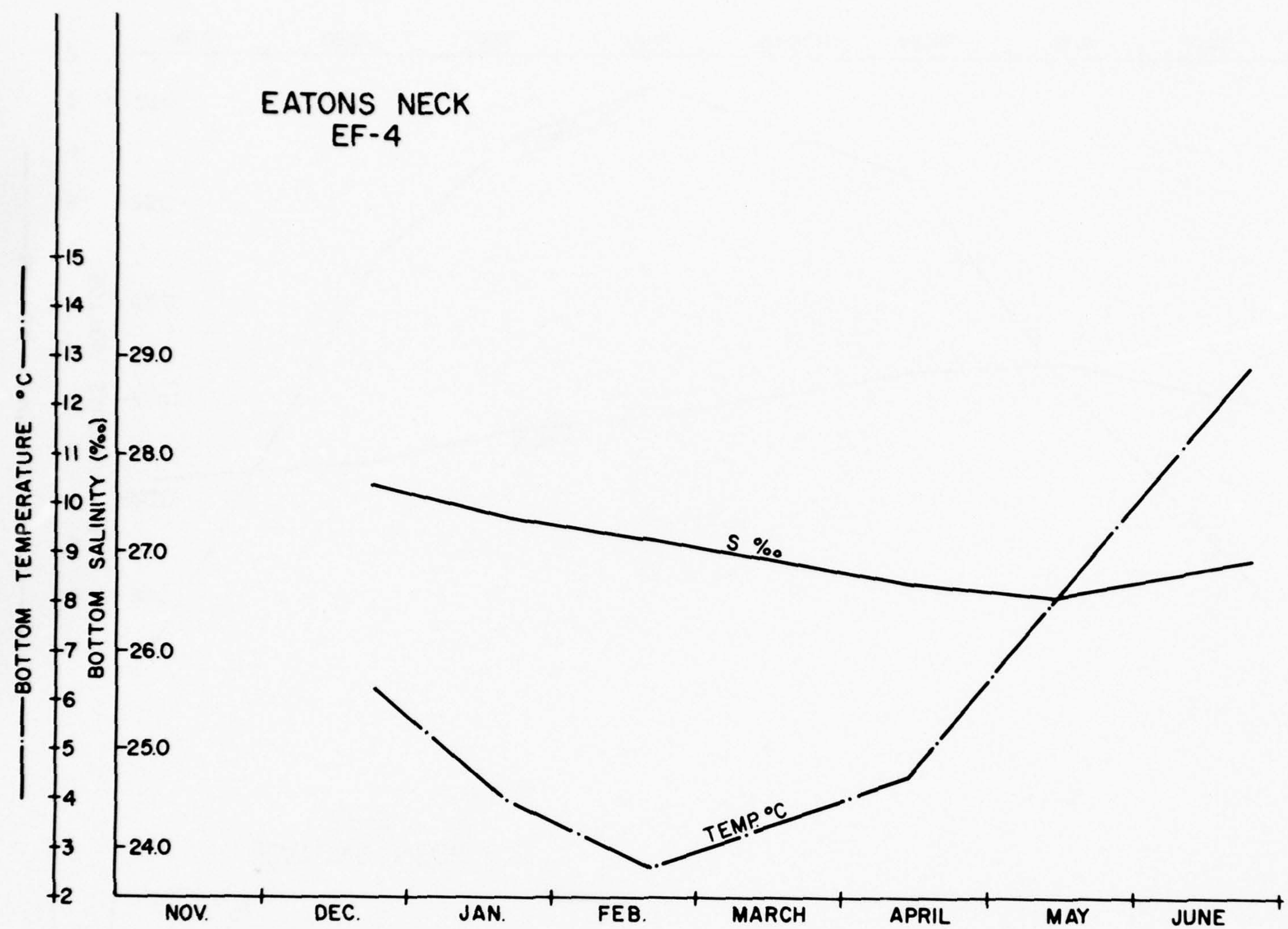


Figure D4 (concluded). Monthly bottom temperatures and salinities of stations at Eatons Neck

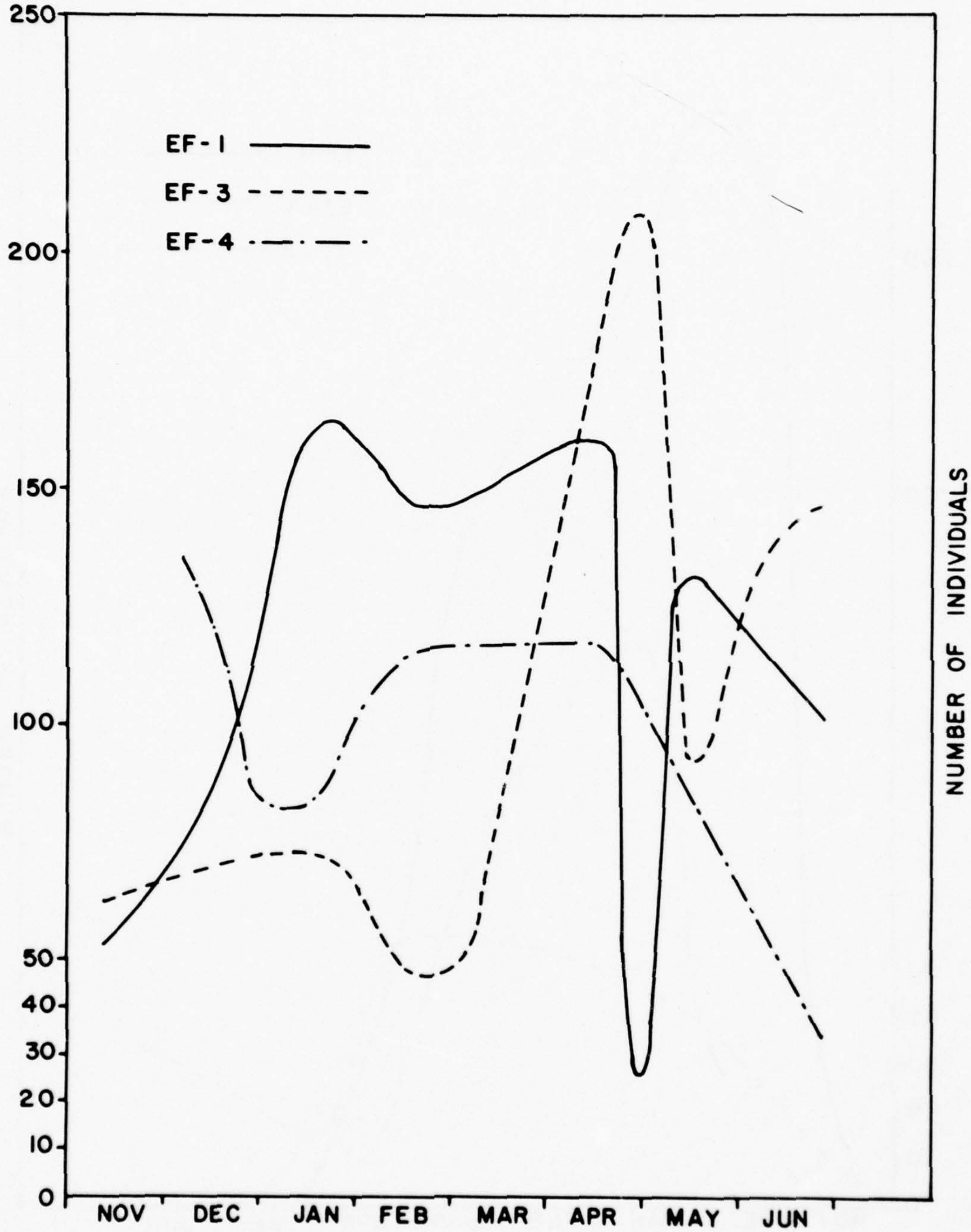


Figure D5. Temporal abundance of windowpane flounder at Eatons Neck stations

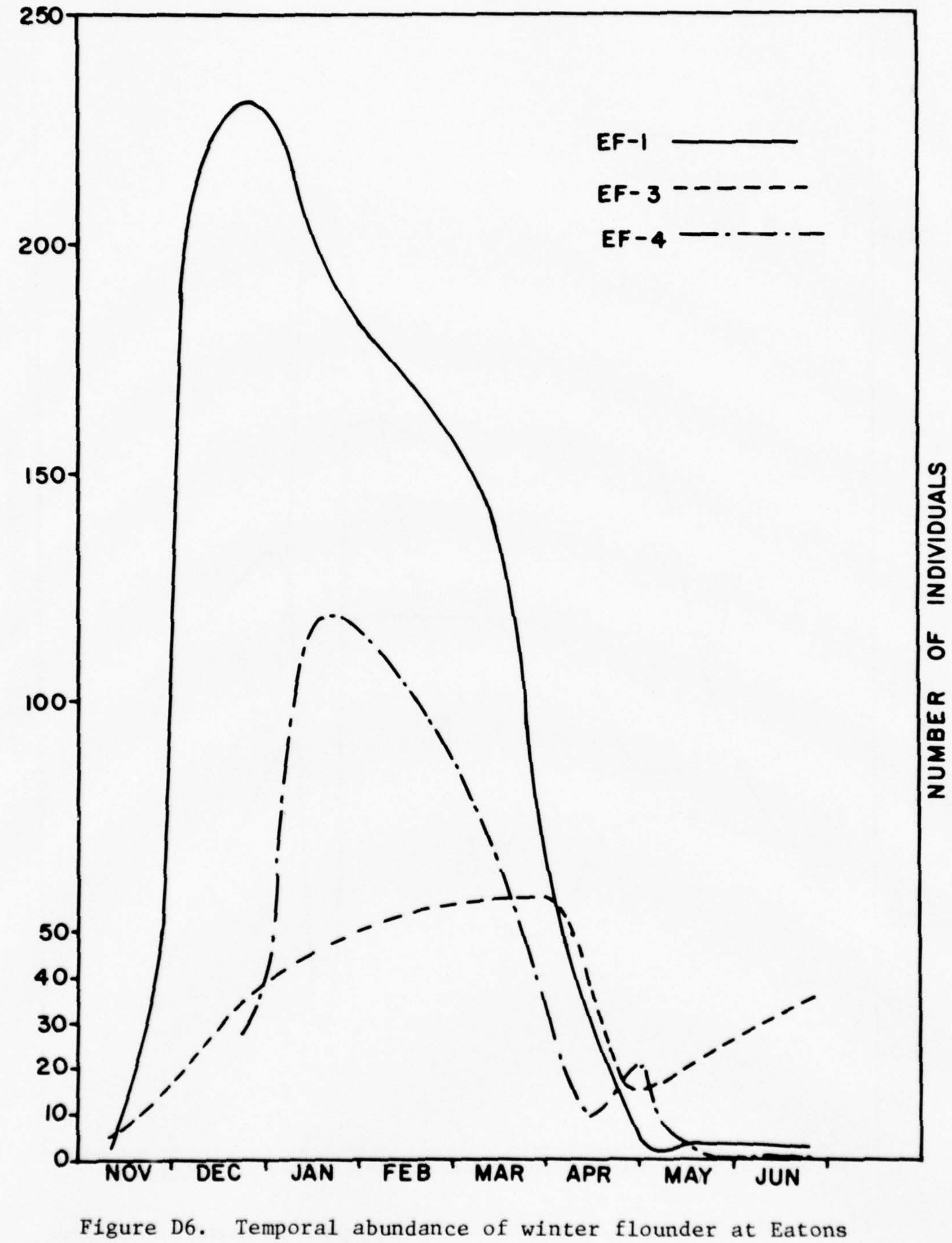


Figure D6. Temporal abundance of winter flounder at Eatons Neck stations

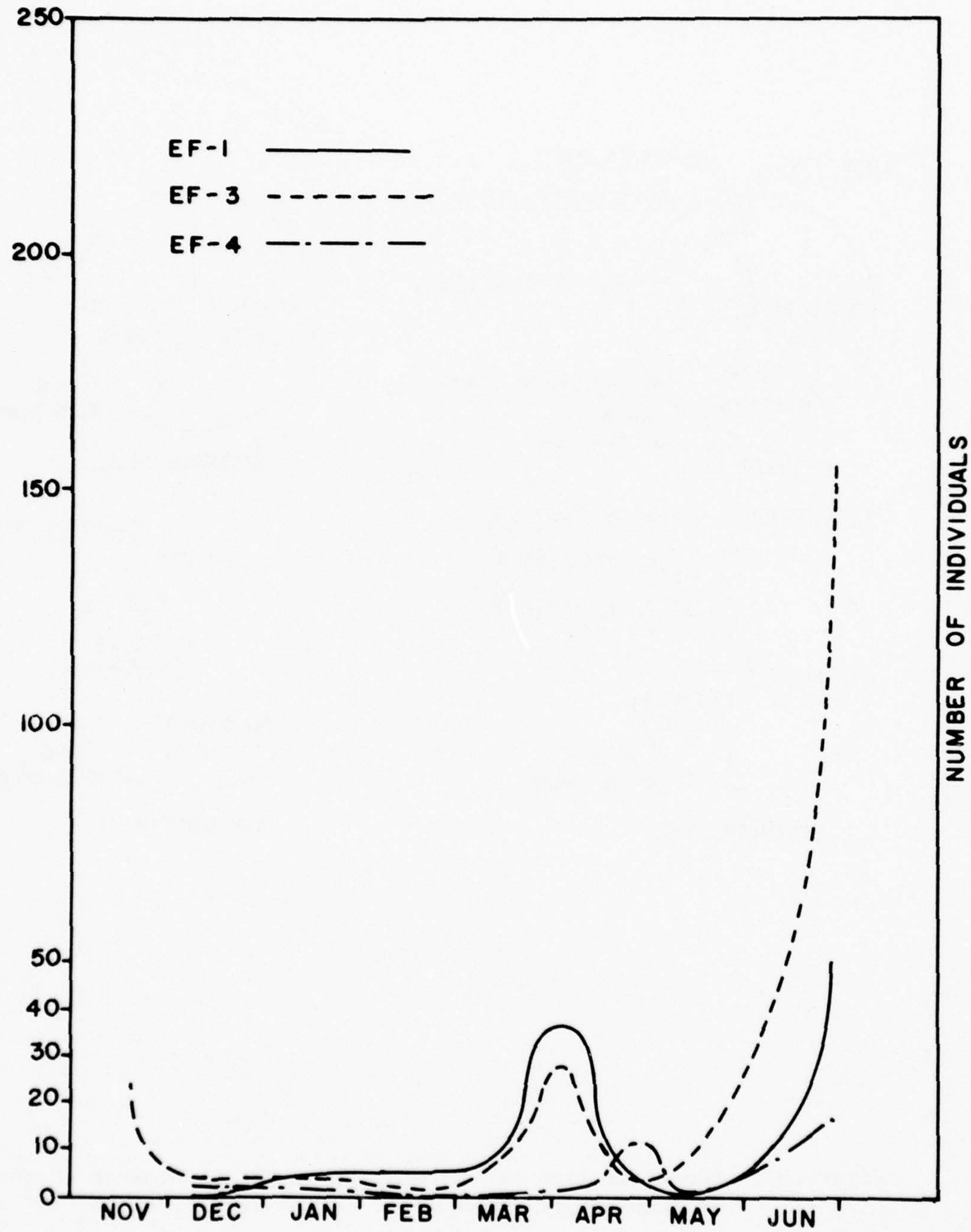


Figure D7. Temporal abundance of red hake at Eatons Neck stations

STOMACH CONTENTS OF:
Stenotomus chrysops

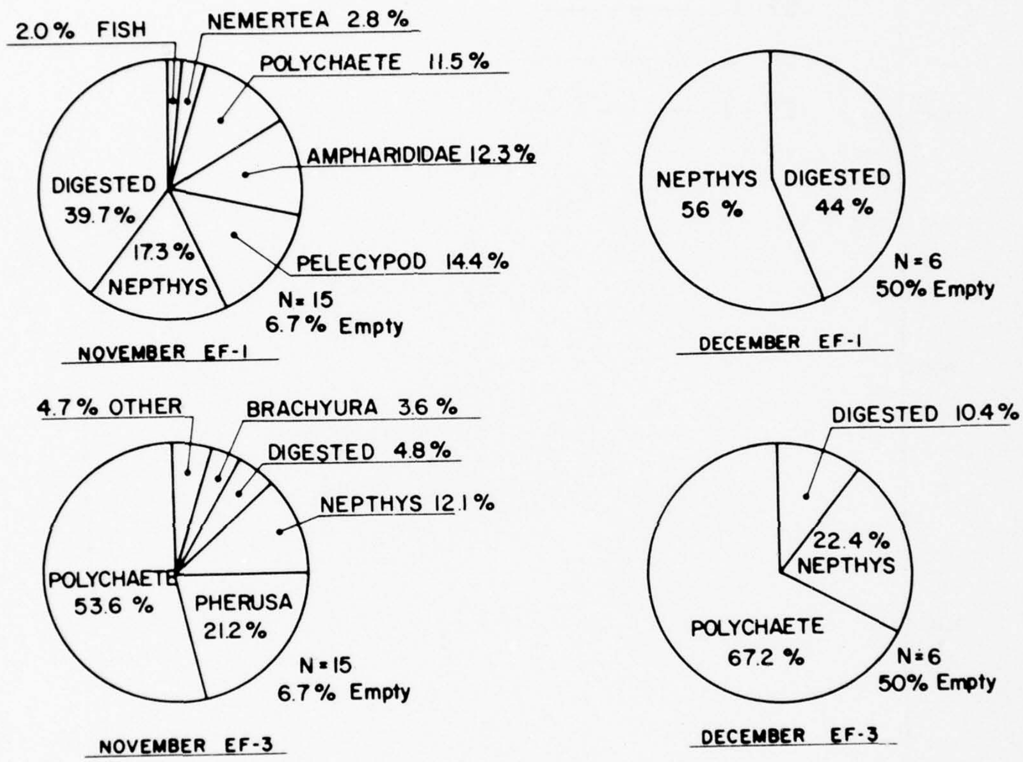
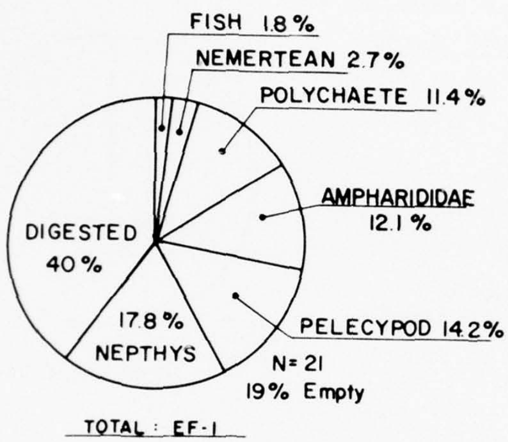
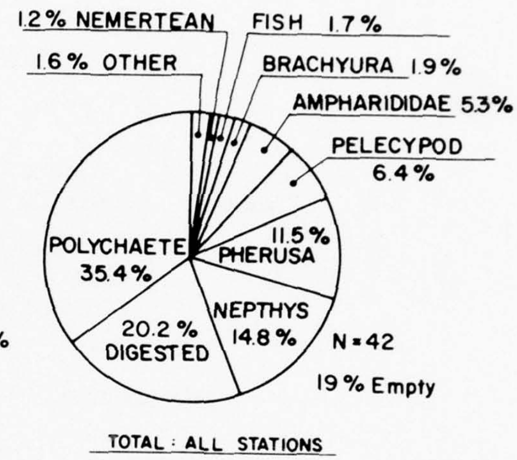


Figure D8. Identification and percent by weight of stomach contents of scup caught trawling at Eatons Neck stations

Stenotomus chrysops





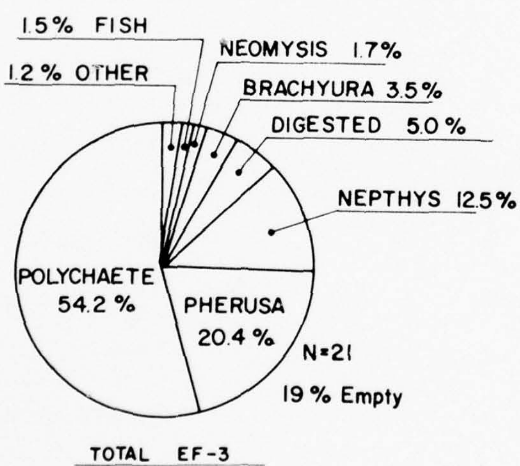


Figure D8 (concluded). Identification and percent by weight of stomach contents of scup caught trawling at Eatons Neck stations

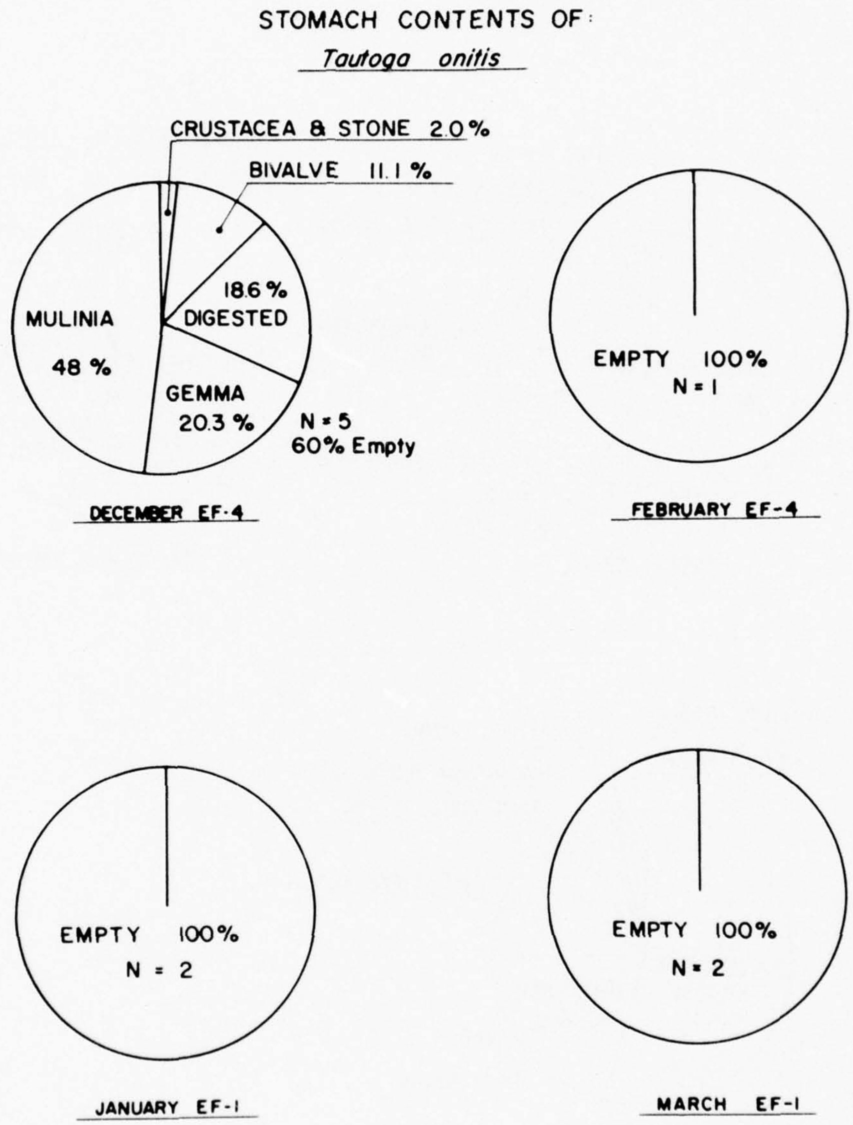


Figure D9. Identification and percent by weight of stomach contents of tautog caught trawling at Eatons Neck stations

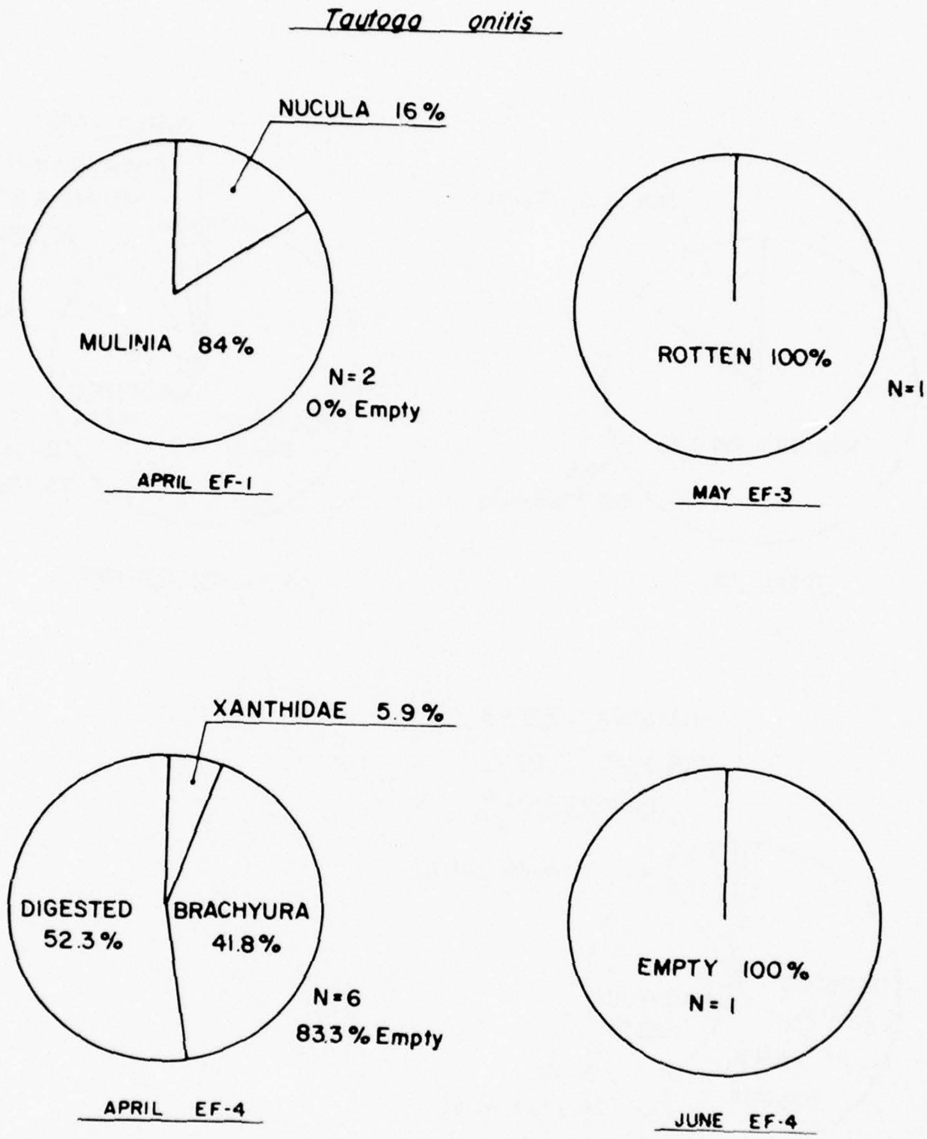
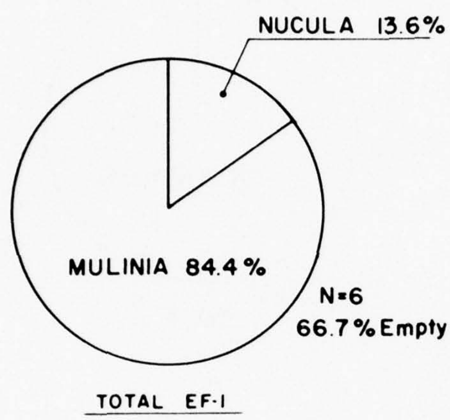
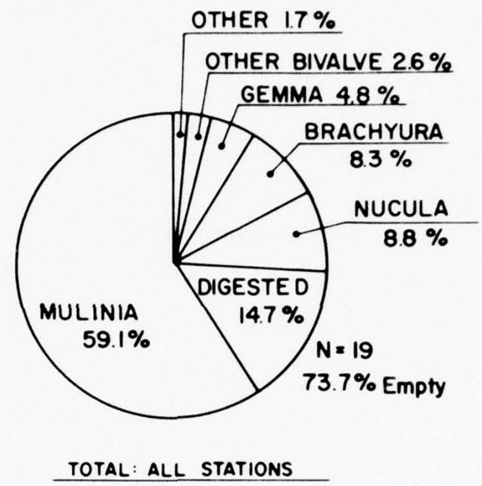


Figure D9 (continued). Identification and percent by weight of stomach contents of tautog caught trawling at Eatons Neck stations

Tautoga onitis





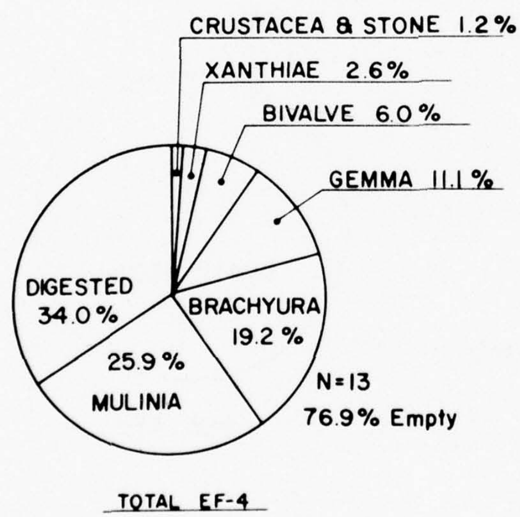


Figure D9 (concluded). Identification and percent by weight of stomach contents of tautog caught trawling at Eatons Neck stations

STOMACH CONTENTS OF:
Tautogolabrus adspersus

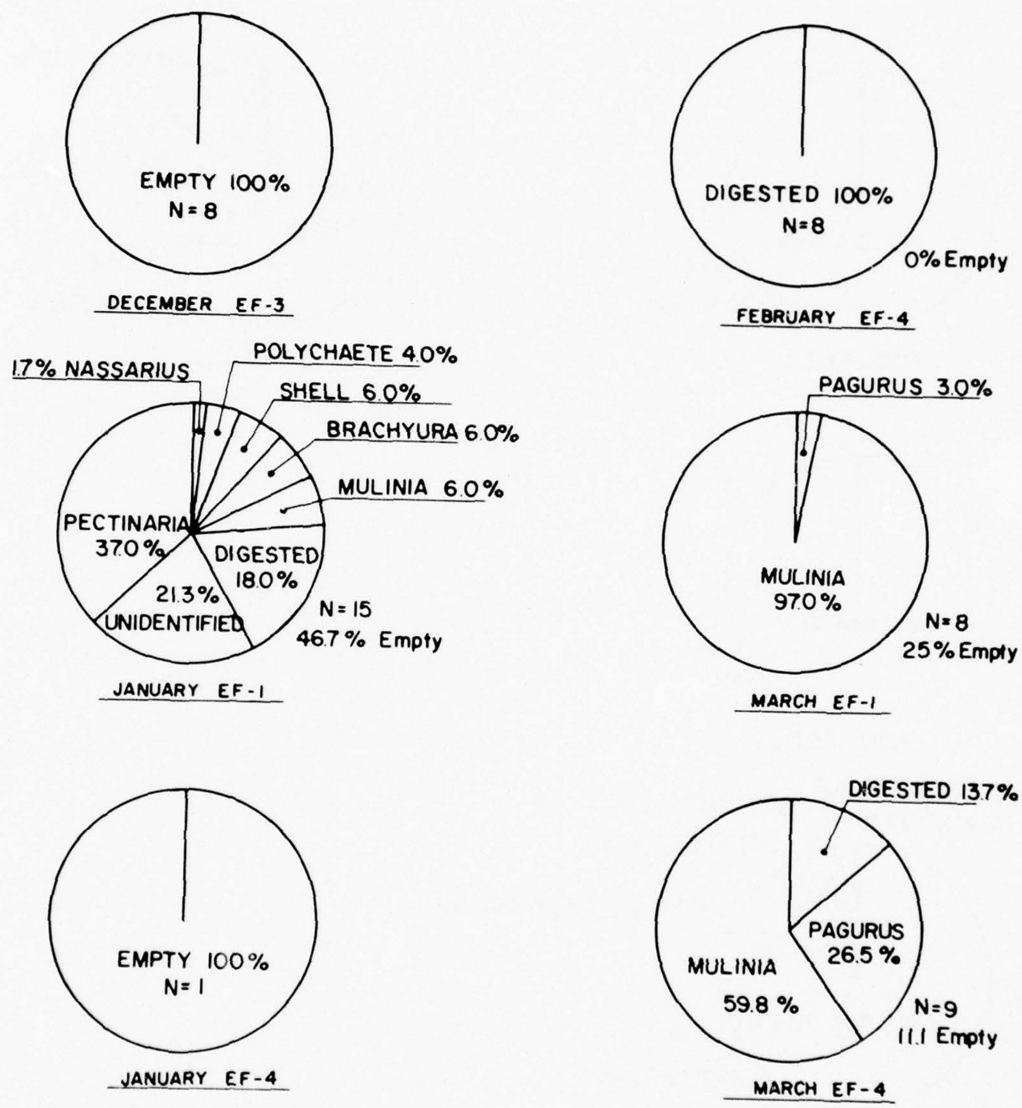


Figure D10. Identification and percent by weight of stomach contents of cunner caught trawling at Eatons Neck stations

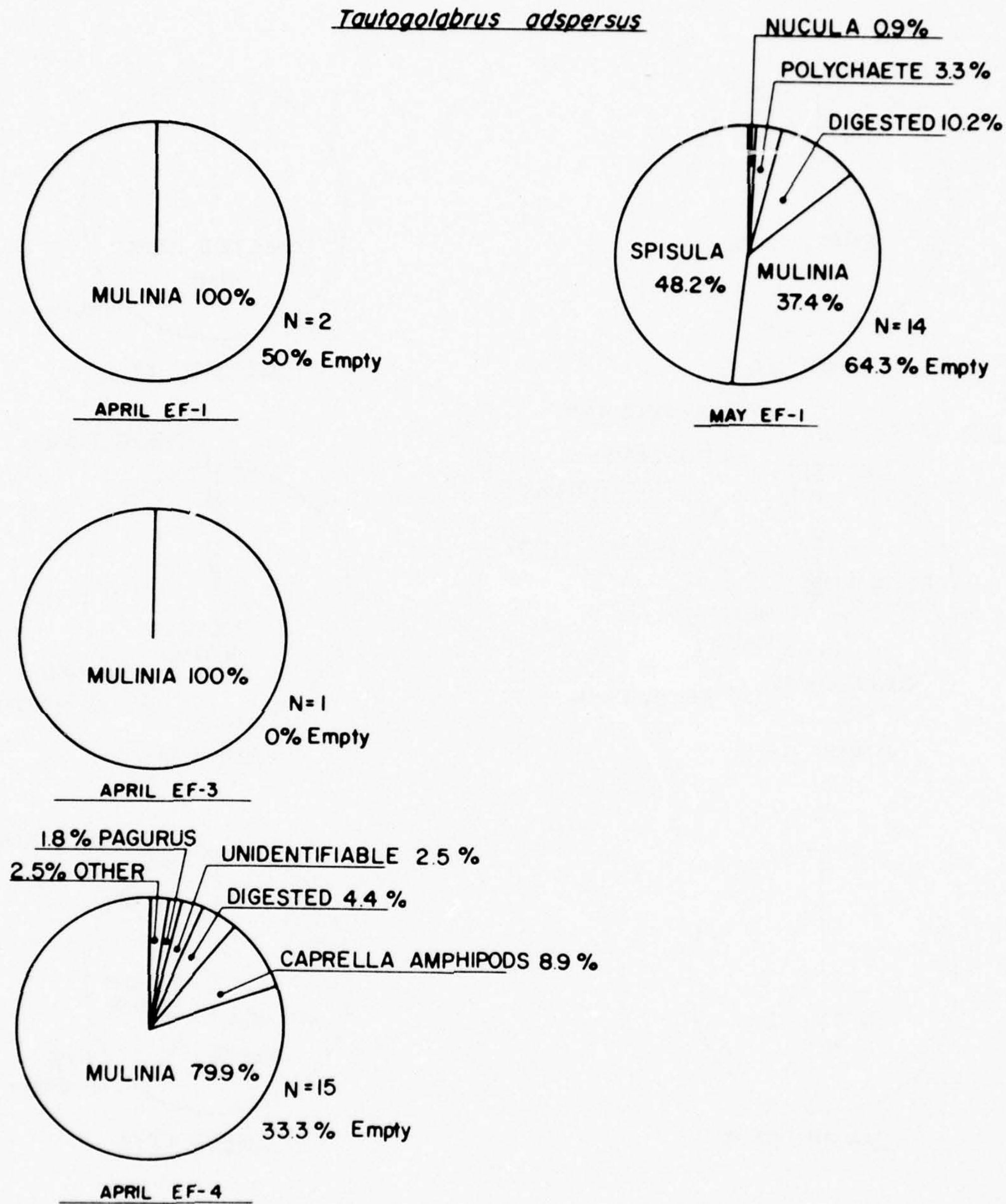


Figure D10 (continued). Identification and percent by weight of stomach contents of cunner caught trawling at Eatons Neck stations

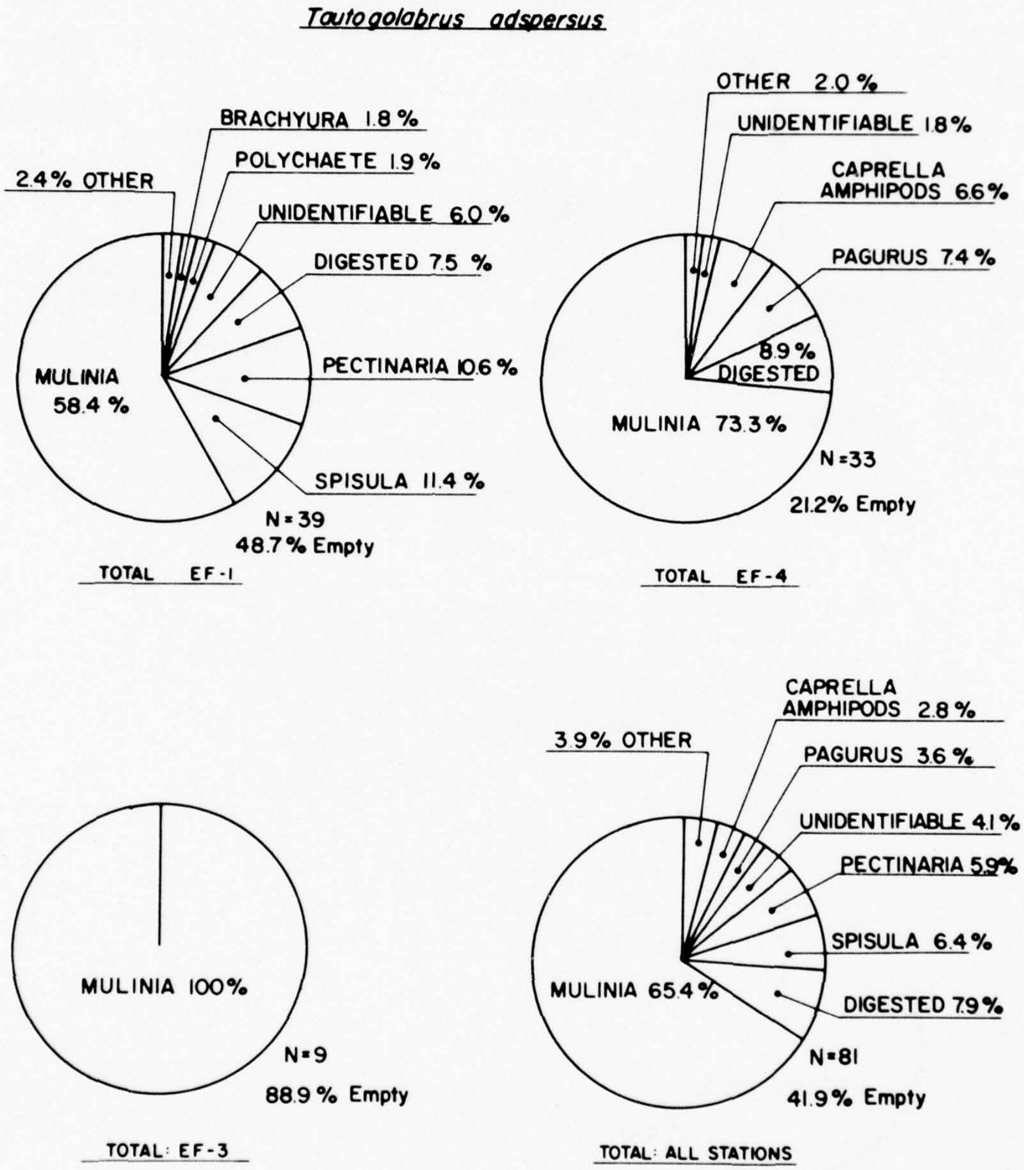


Figure D10 (concluded). Identification and percent by weight of stomach contents of cunner caught trawling at Eatons Neck stations

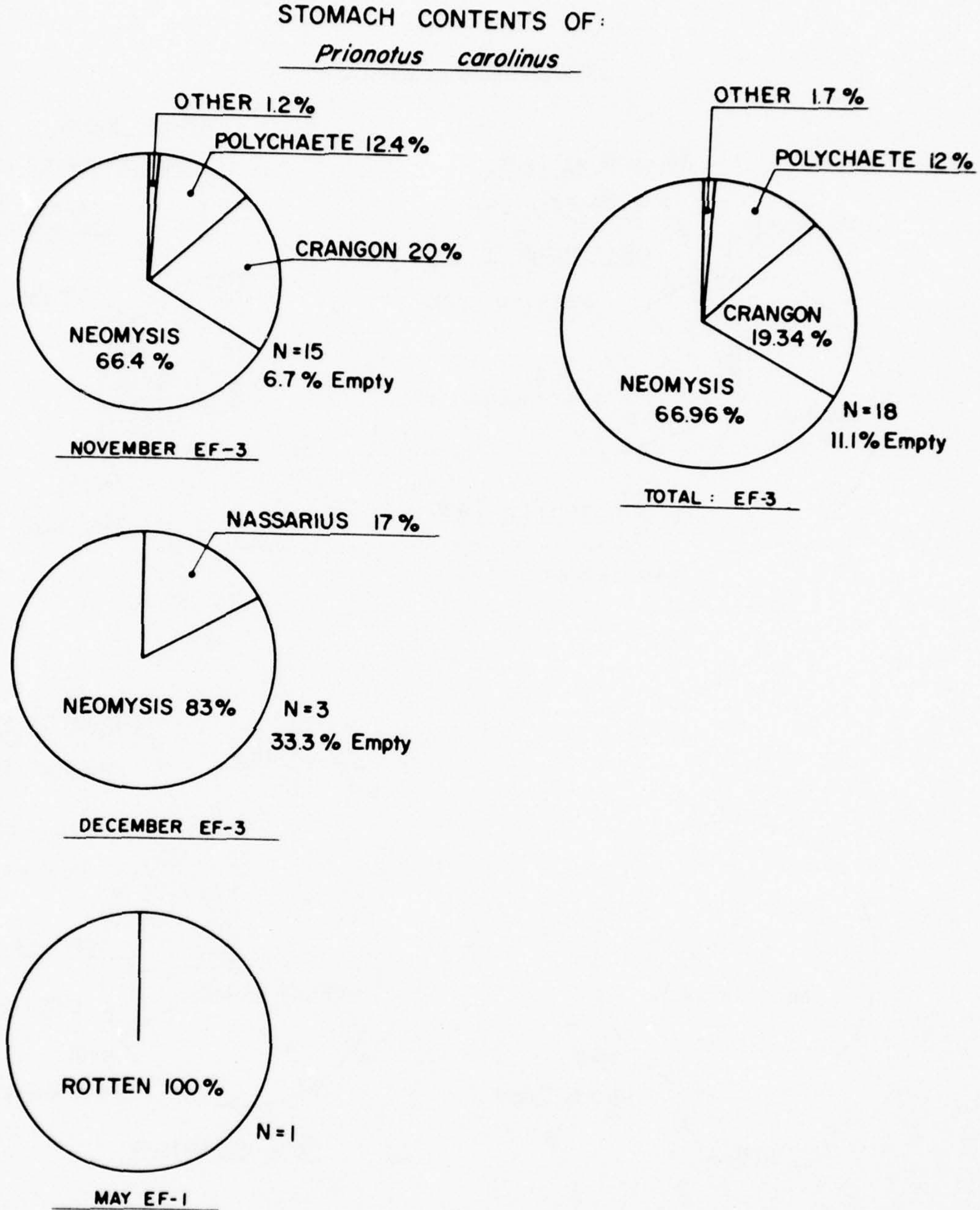


Figure D11. Identification and percent by weight of stomach contents of common searobin caught trawling at Eatons Neck stations

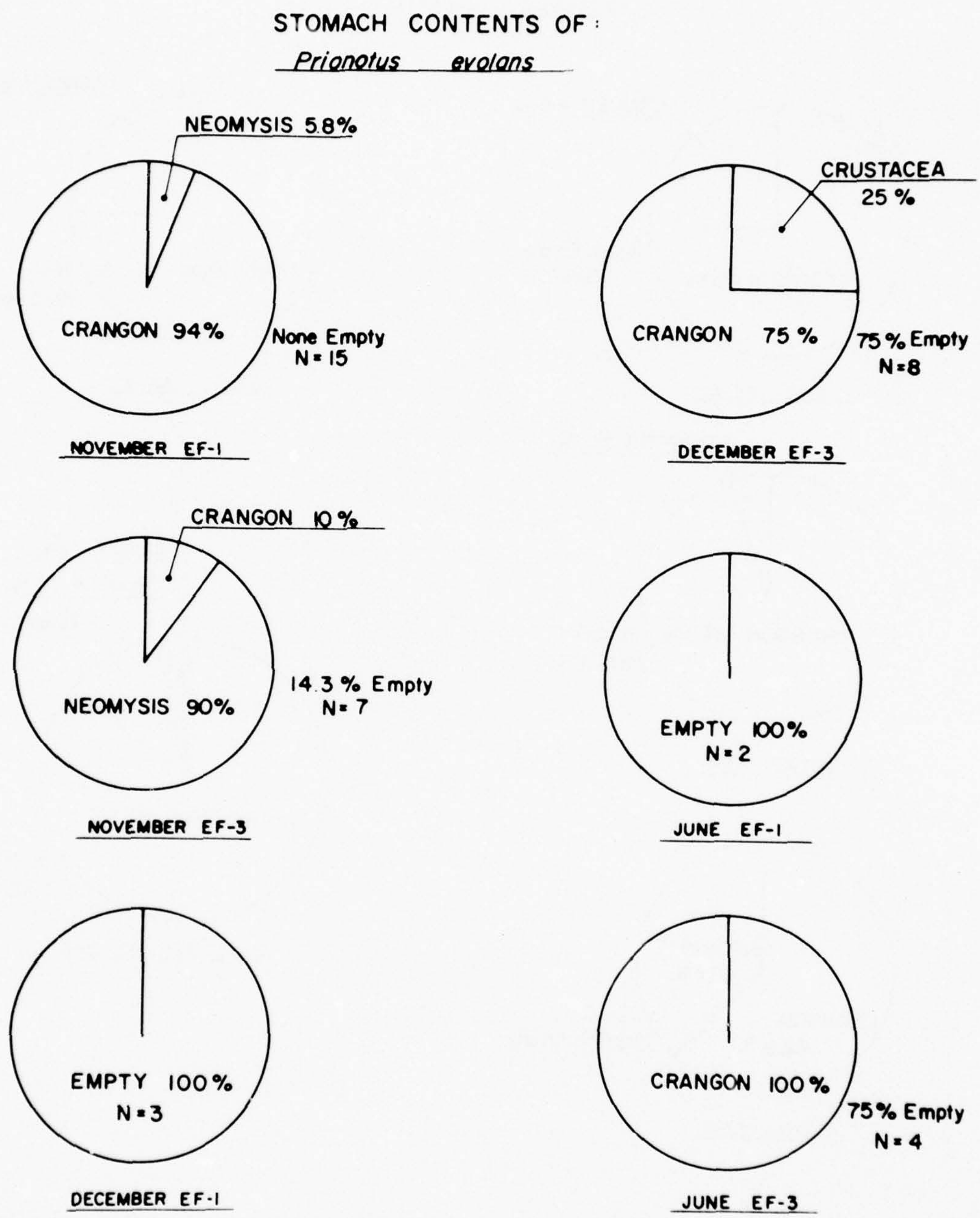


Figure D12. Identification and percent by weight of stomach contents of striped searobin caught trawling at Eatons Neck stations

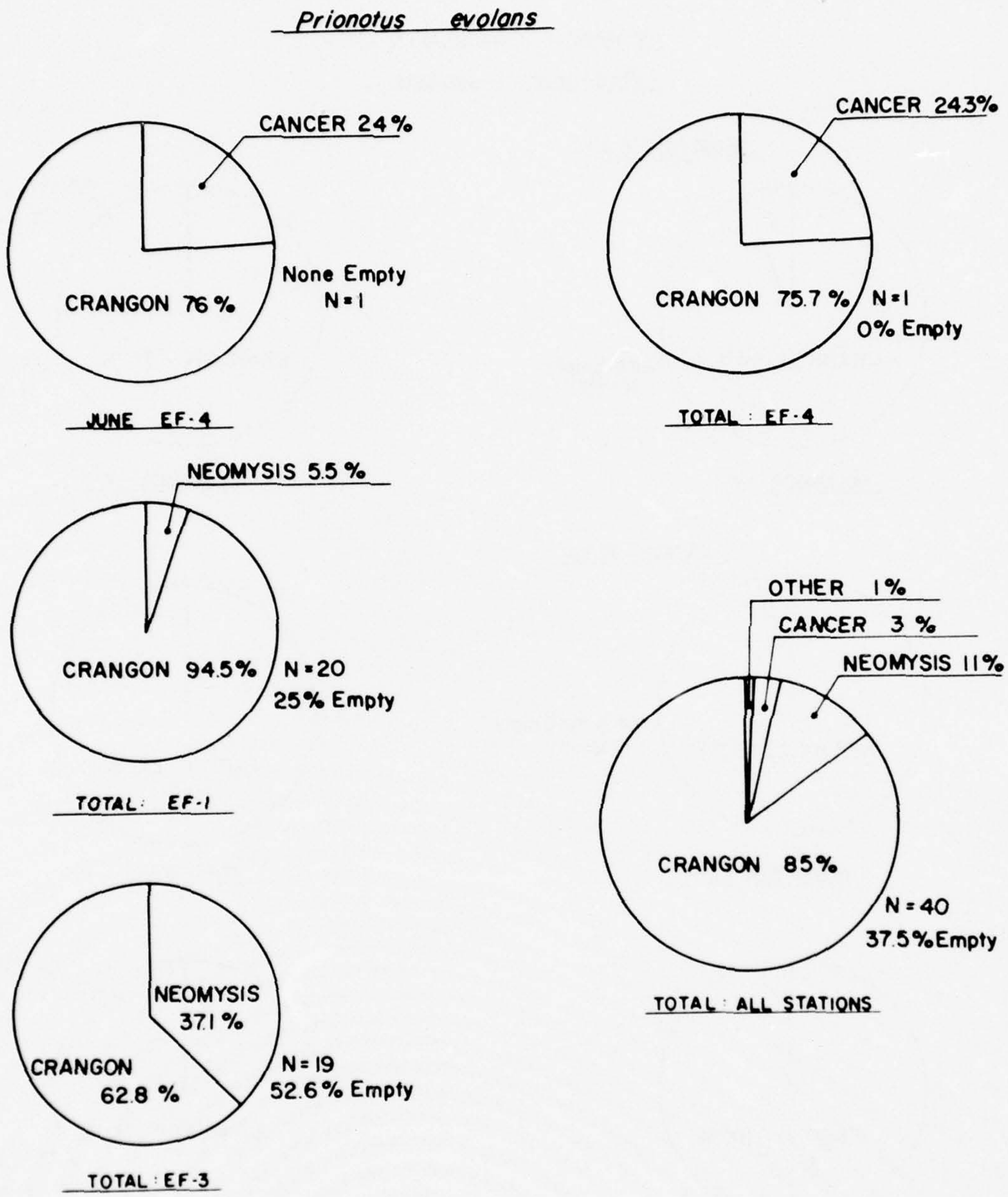


Figure D12 (concluded). Identification and percent by weight of stomach contents of striped searobin caught trawling at Eatons Neck stations

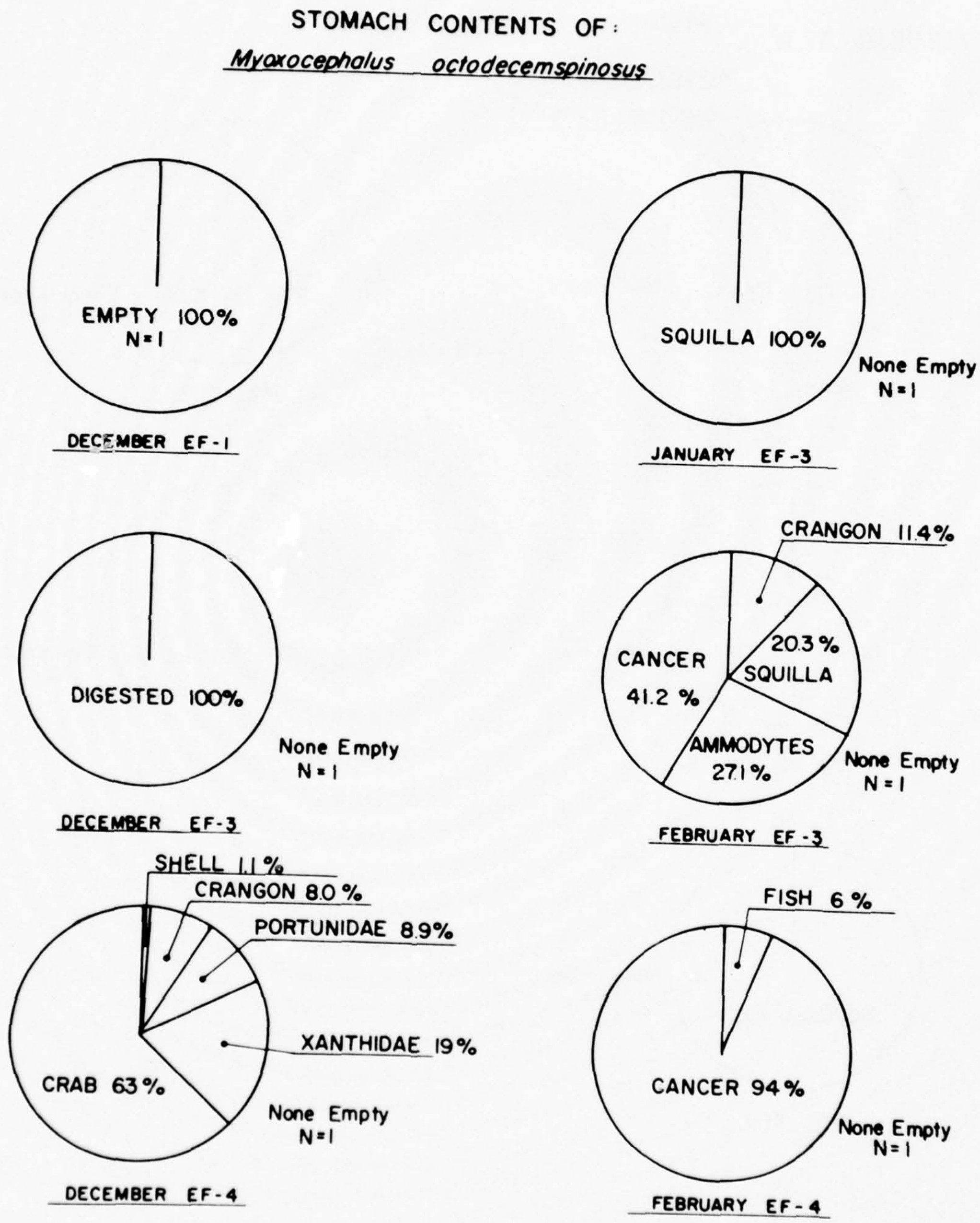


Figure D13. Identification and percent by weight of stomach contents of longhorn sculpin caught trawling at Eatons Neck stations

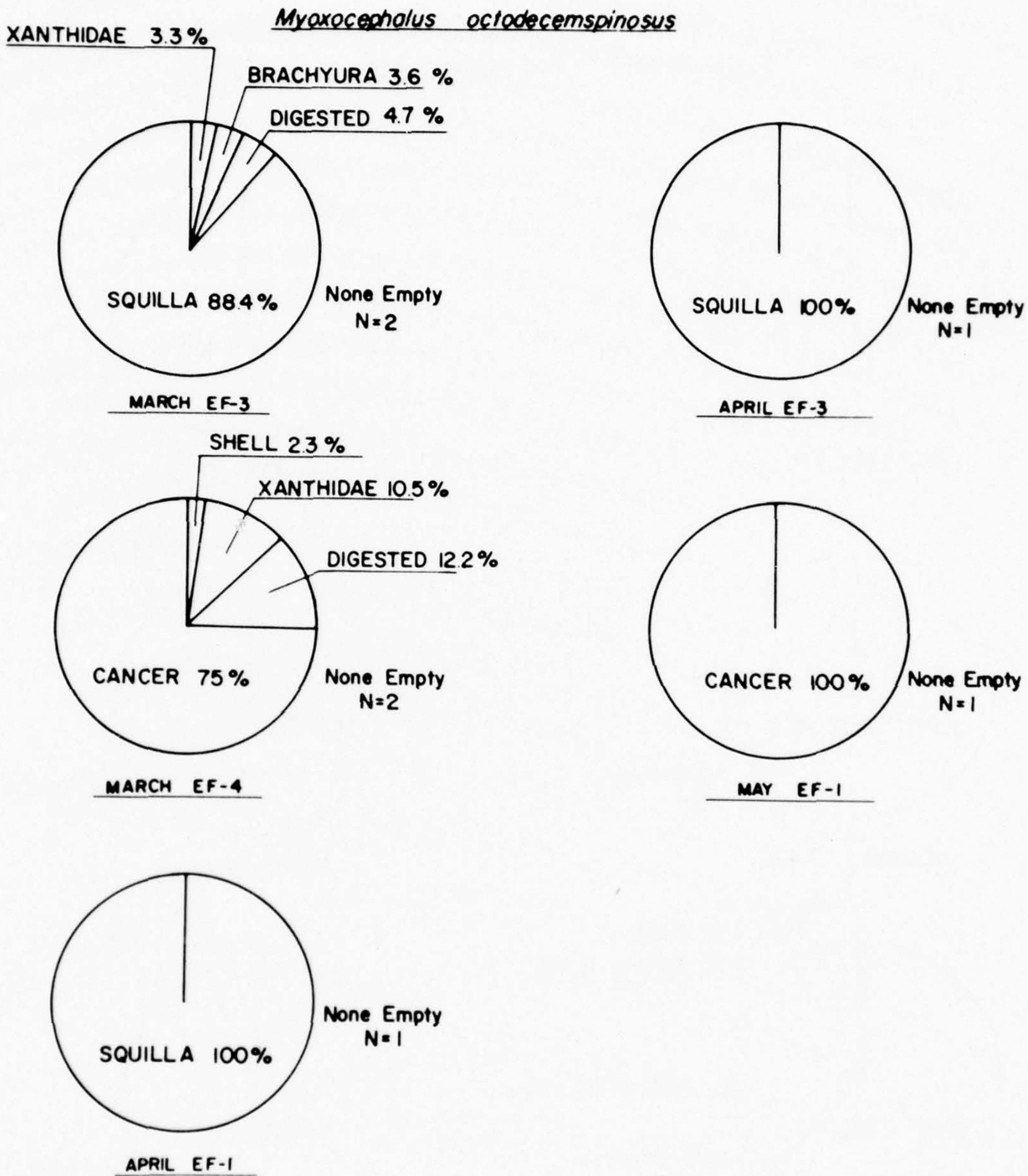


Figure D13 (continued). Identification and percent by weight of stomach contents of longhorn sculpin caught trawling at Eatons Neck stations

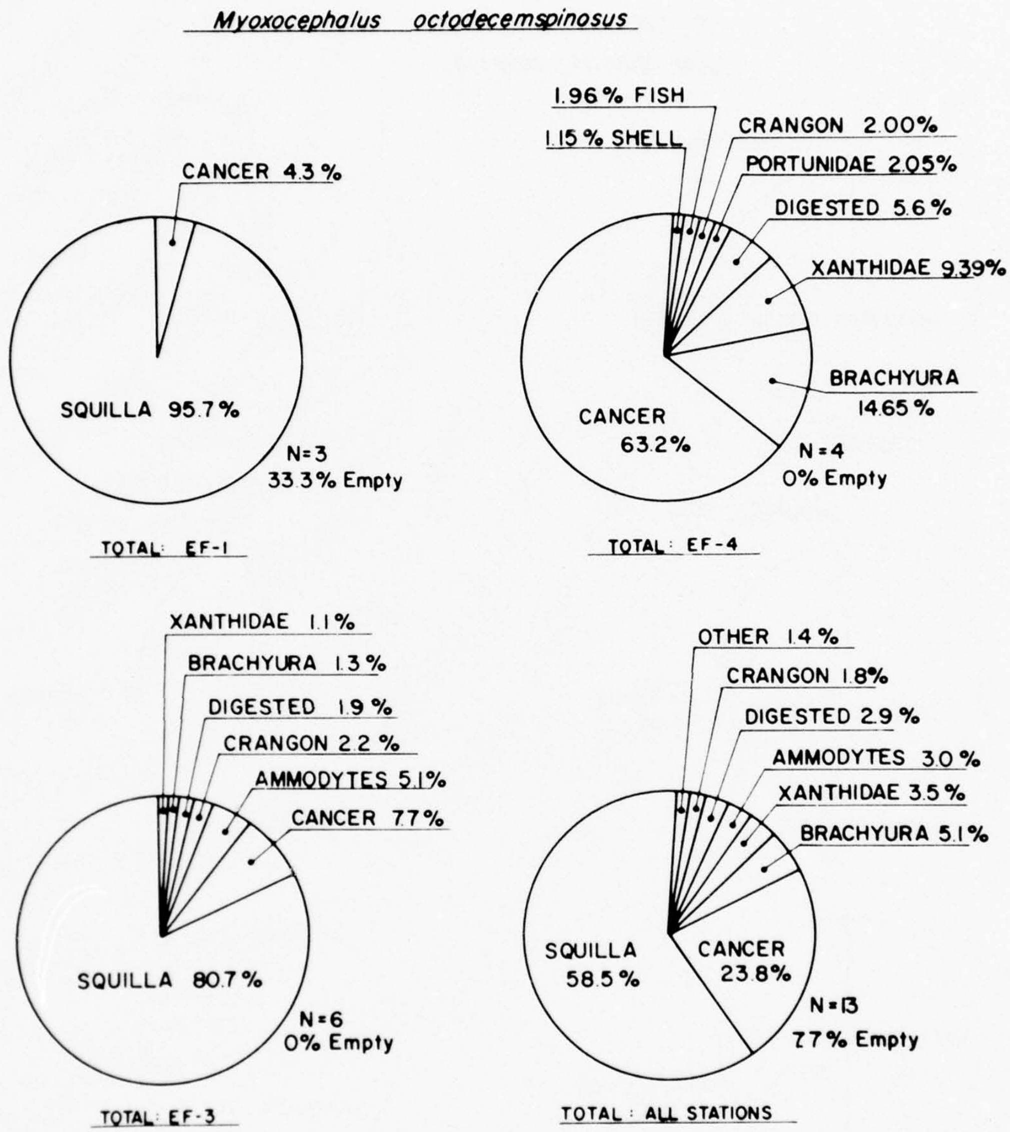


Figure D13 (concluded). Identification and percent by weight of stomach contents of longhorn sculpin caught trawling at Eatons Neck stations

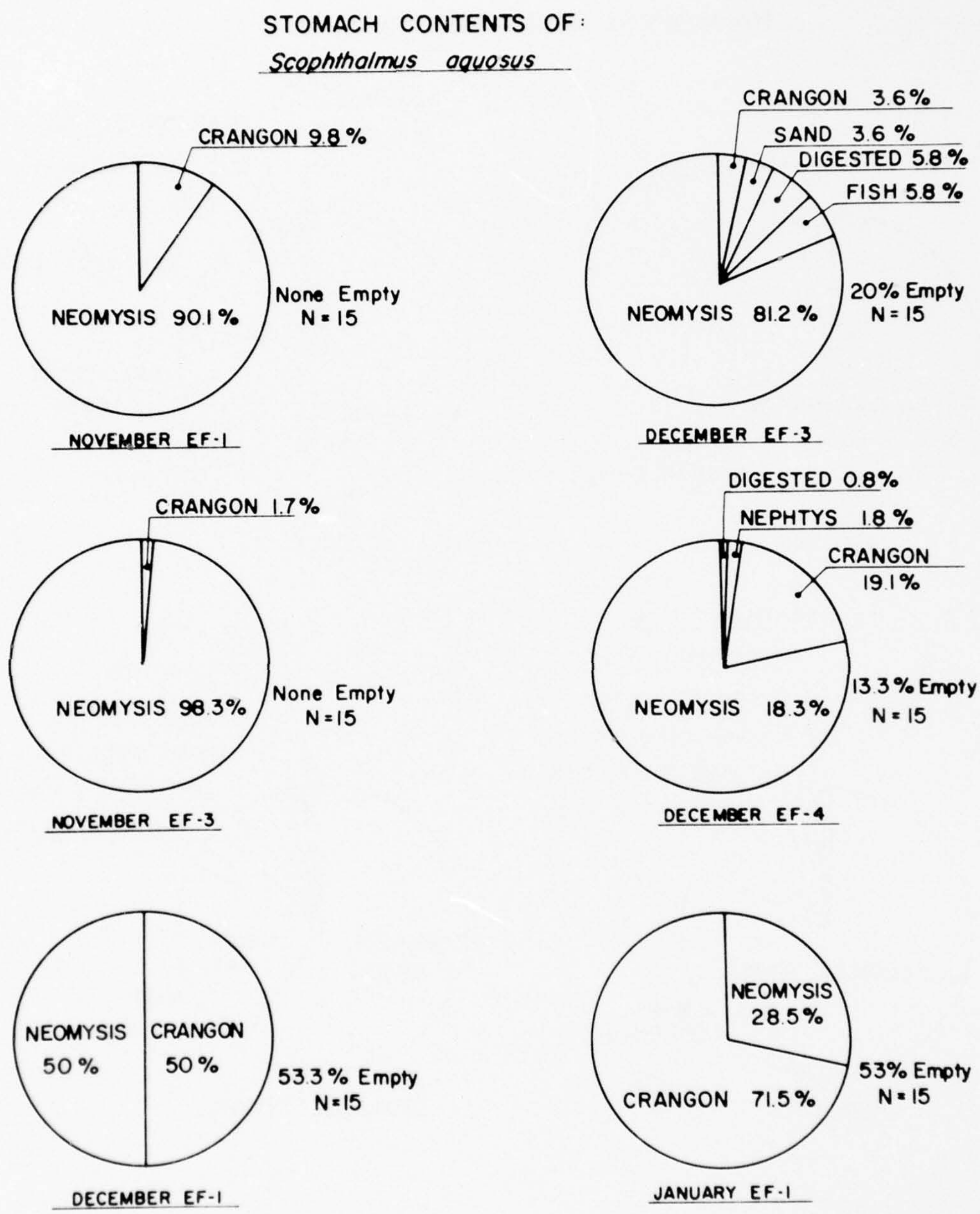


Figure D14. Identification and percent by weight of stomach contents of windowpane flounder caught trawling at Eatons Neck stations

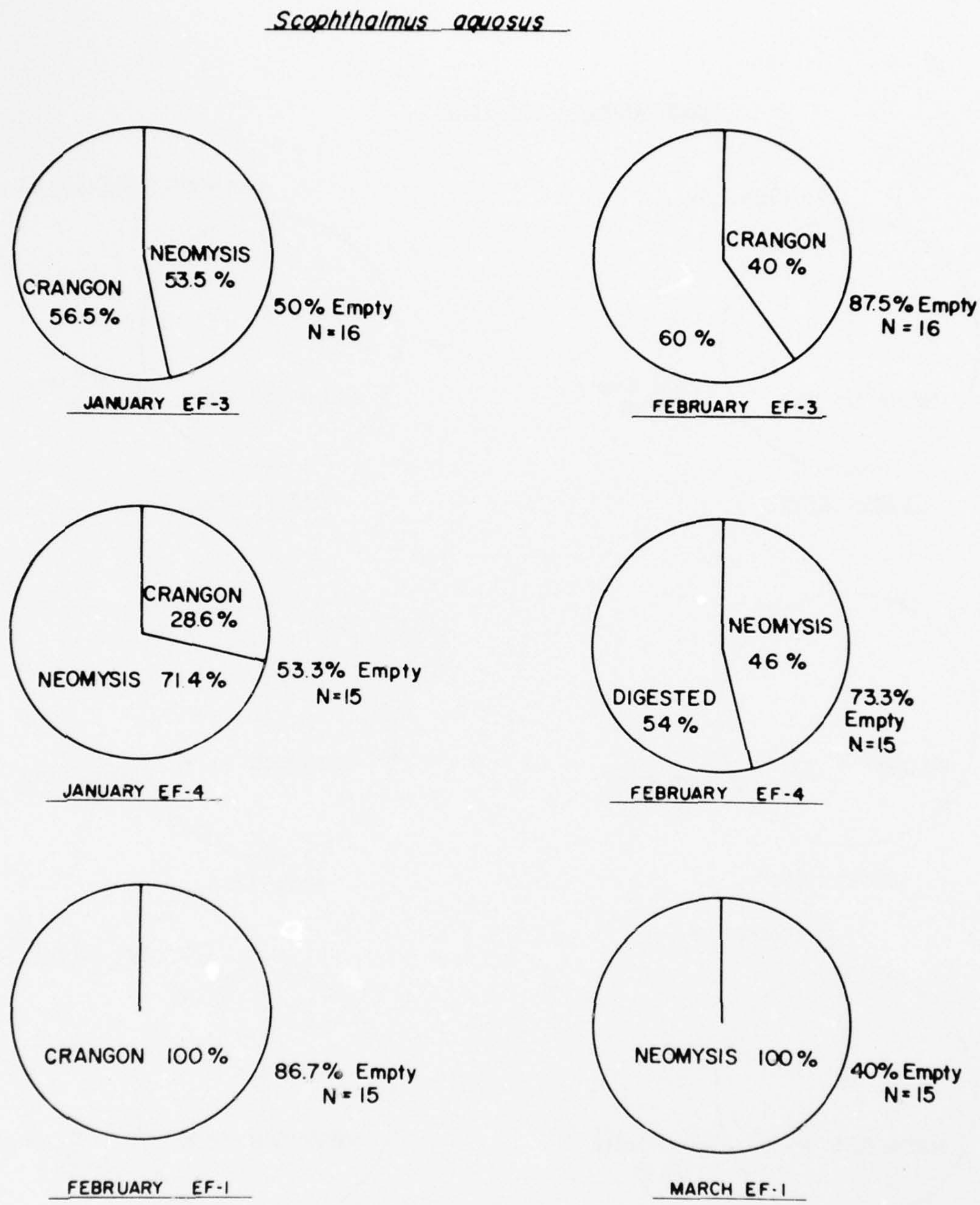


Figure D14 (continued). Identification and percent by weight of stomach contents of windowpane flounder caught trawling at Eatons Neck stations

Scophthalmus aquosus

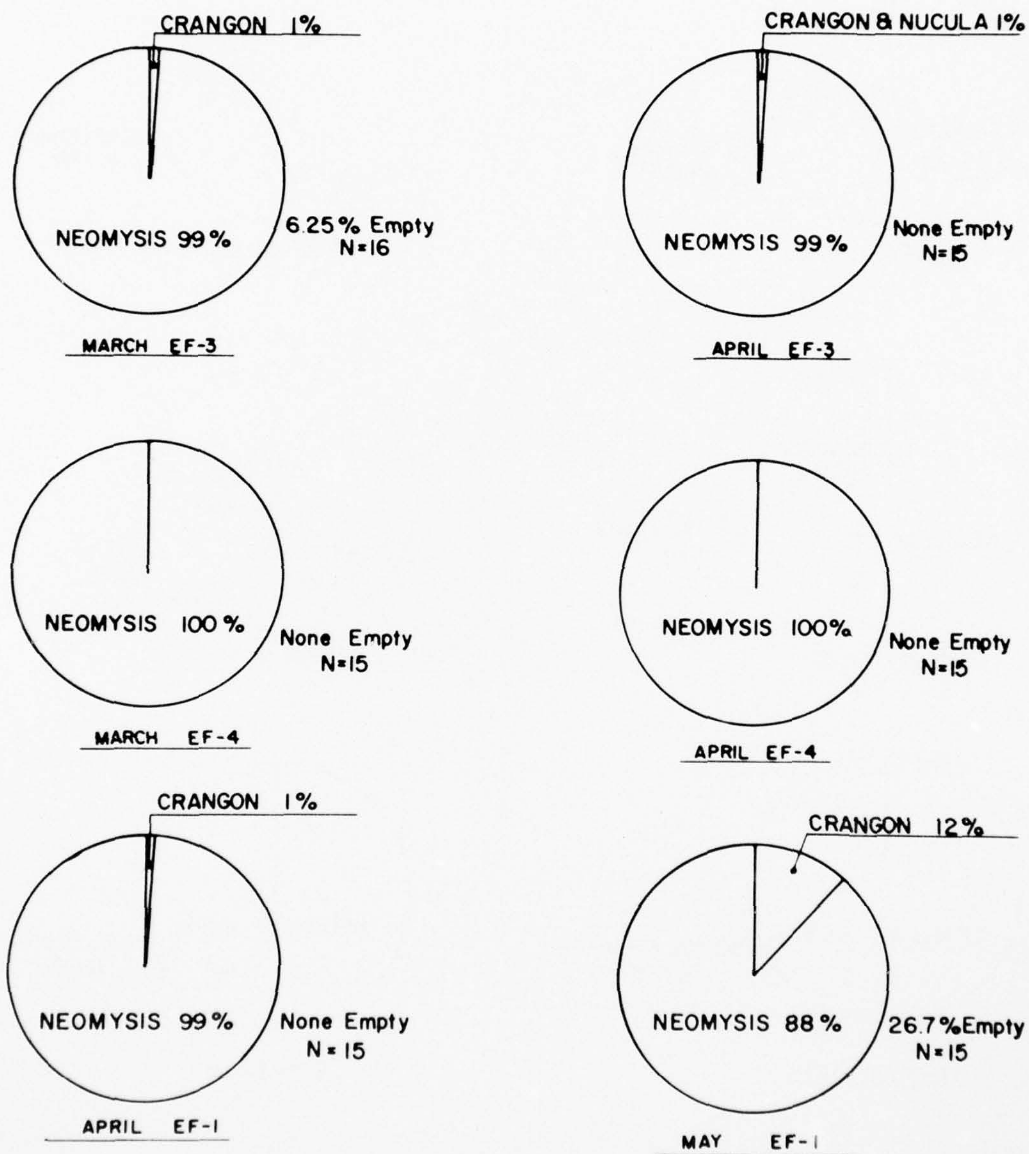


Figure D14 (continued). Identification and percent by weight of stomach contents of windowpane flounder caught trawling at Eatons Neck stations

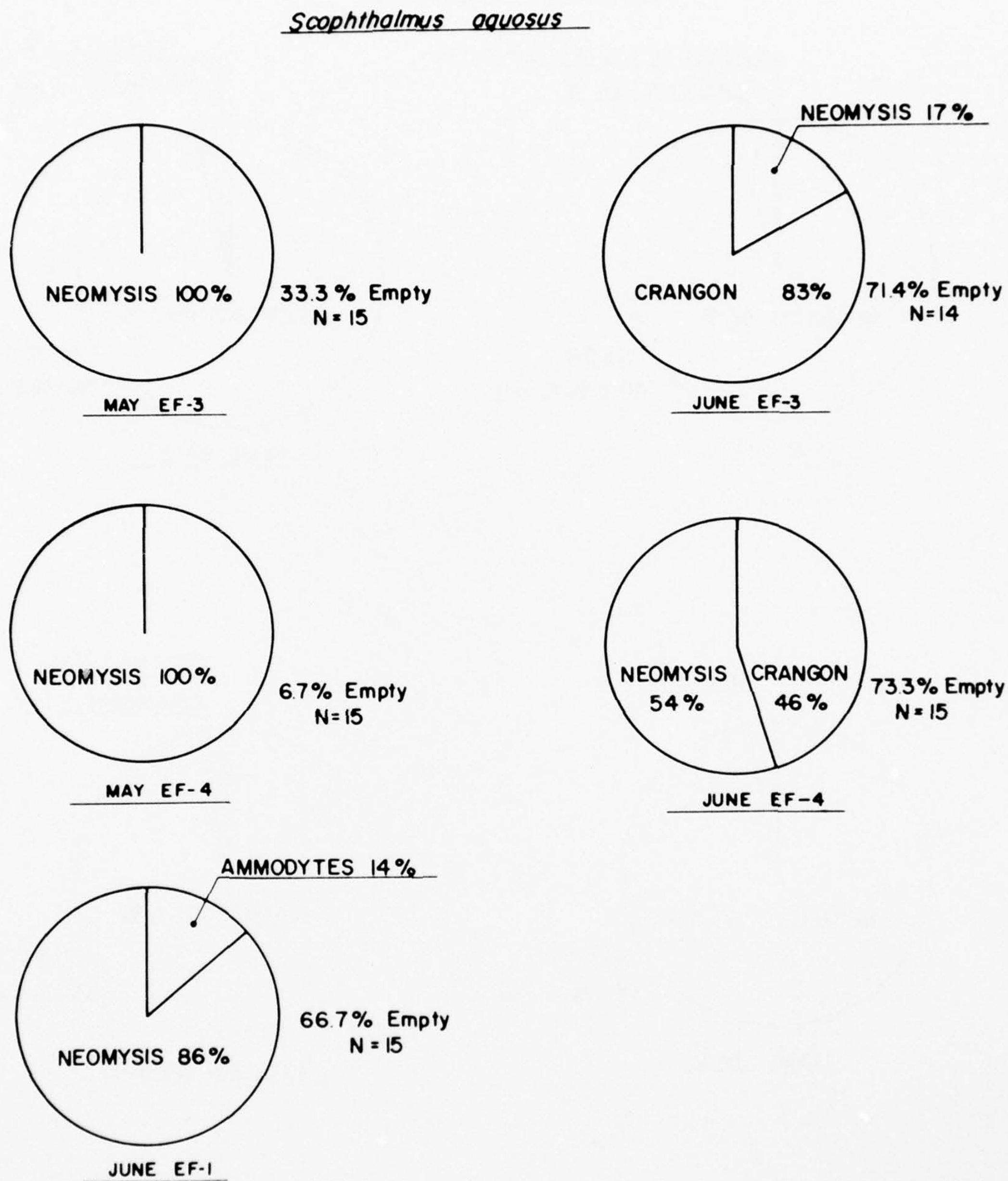


Figure D14 (continued). Identification and percent by weight of stomach contents of windowpane flounder caught trawling at Eatons Neck stations

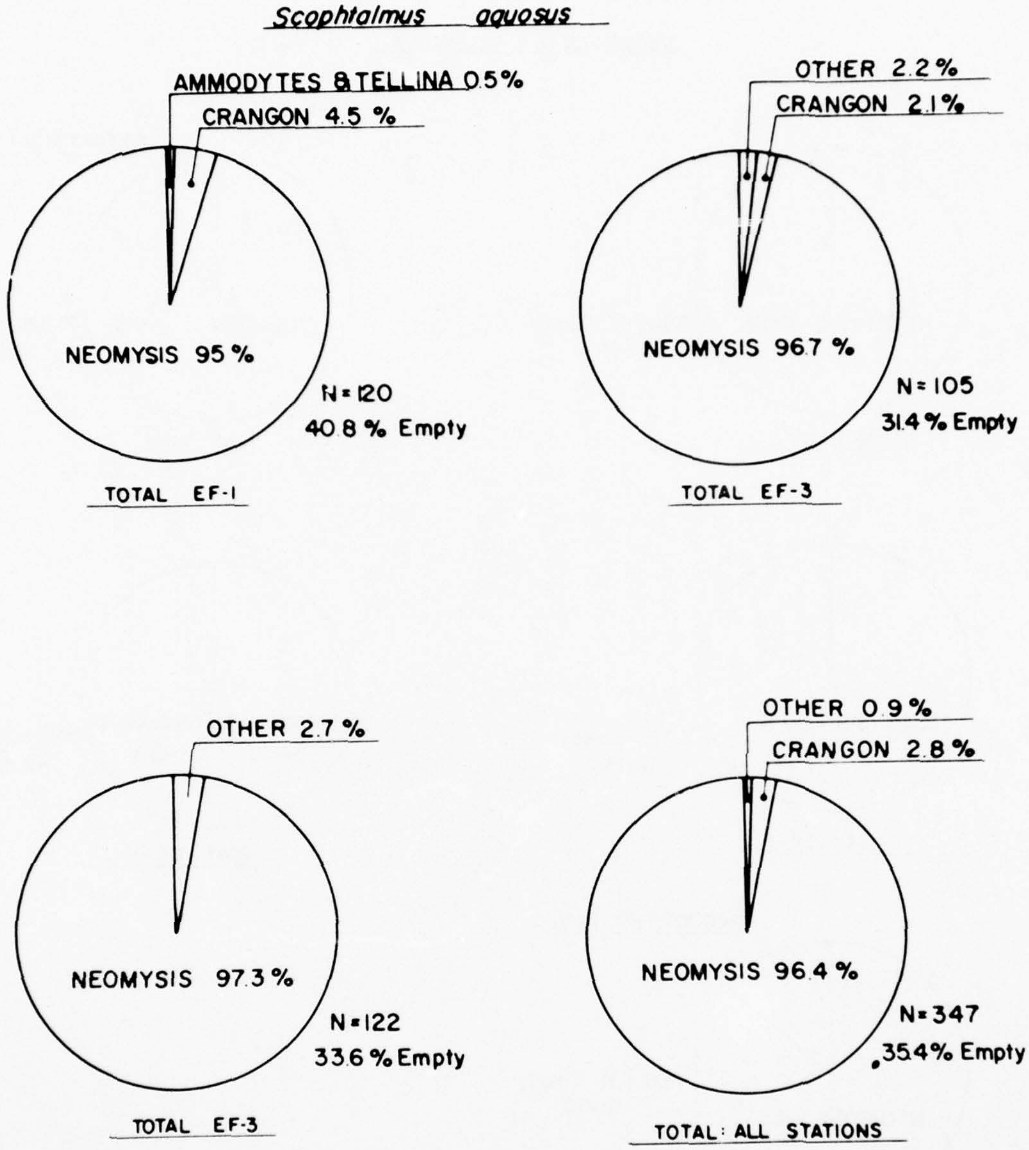


Figure D14 (concluded). Identification and percent by weight of stomach contents of windowpane flounder caught trawling at Eatons Neck stations

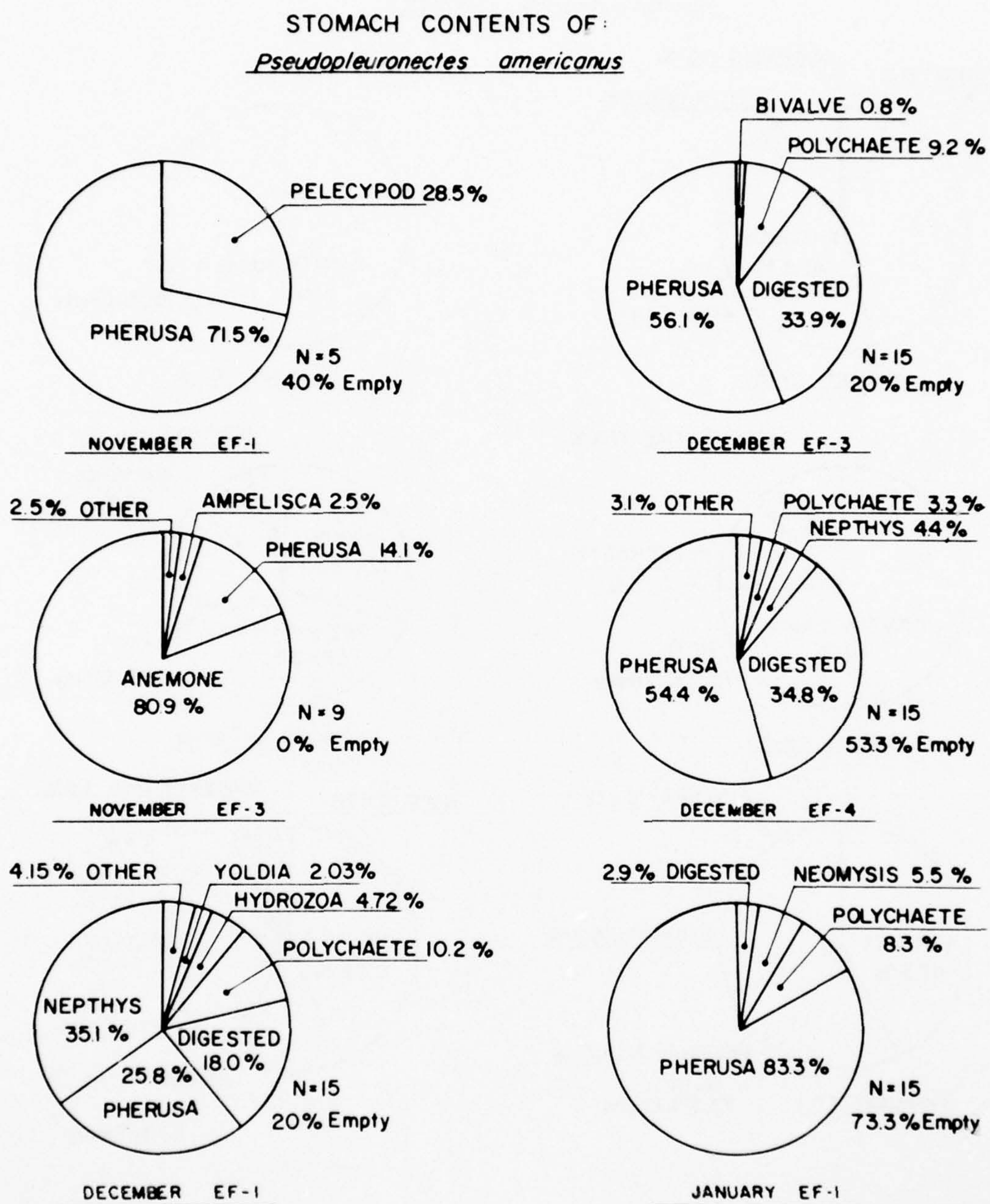


Figure D15. Identification and percent by weight of stomach contents of winter flounder caught trawling at Eatons Neck stations

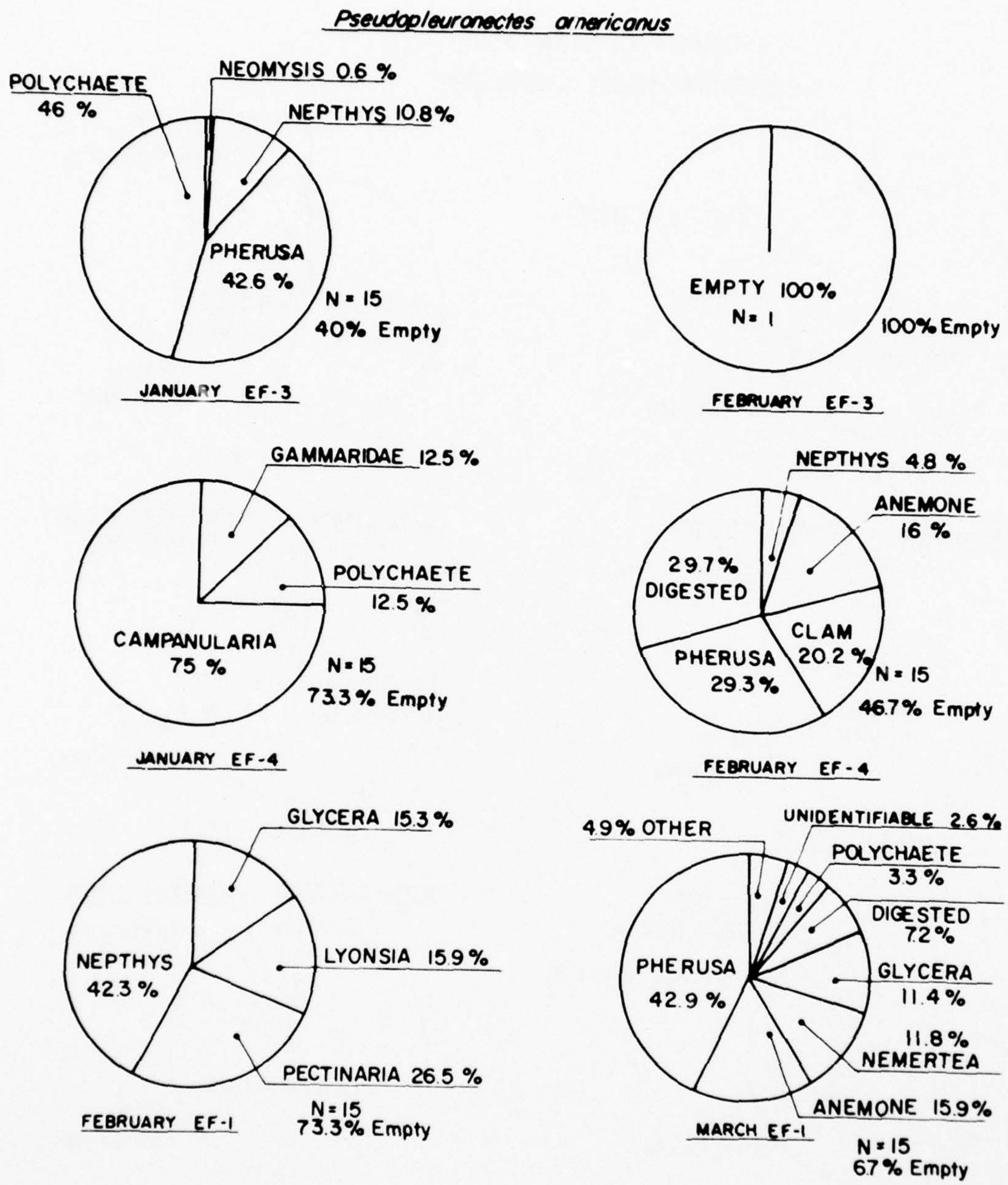
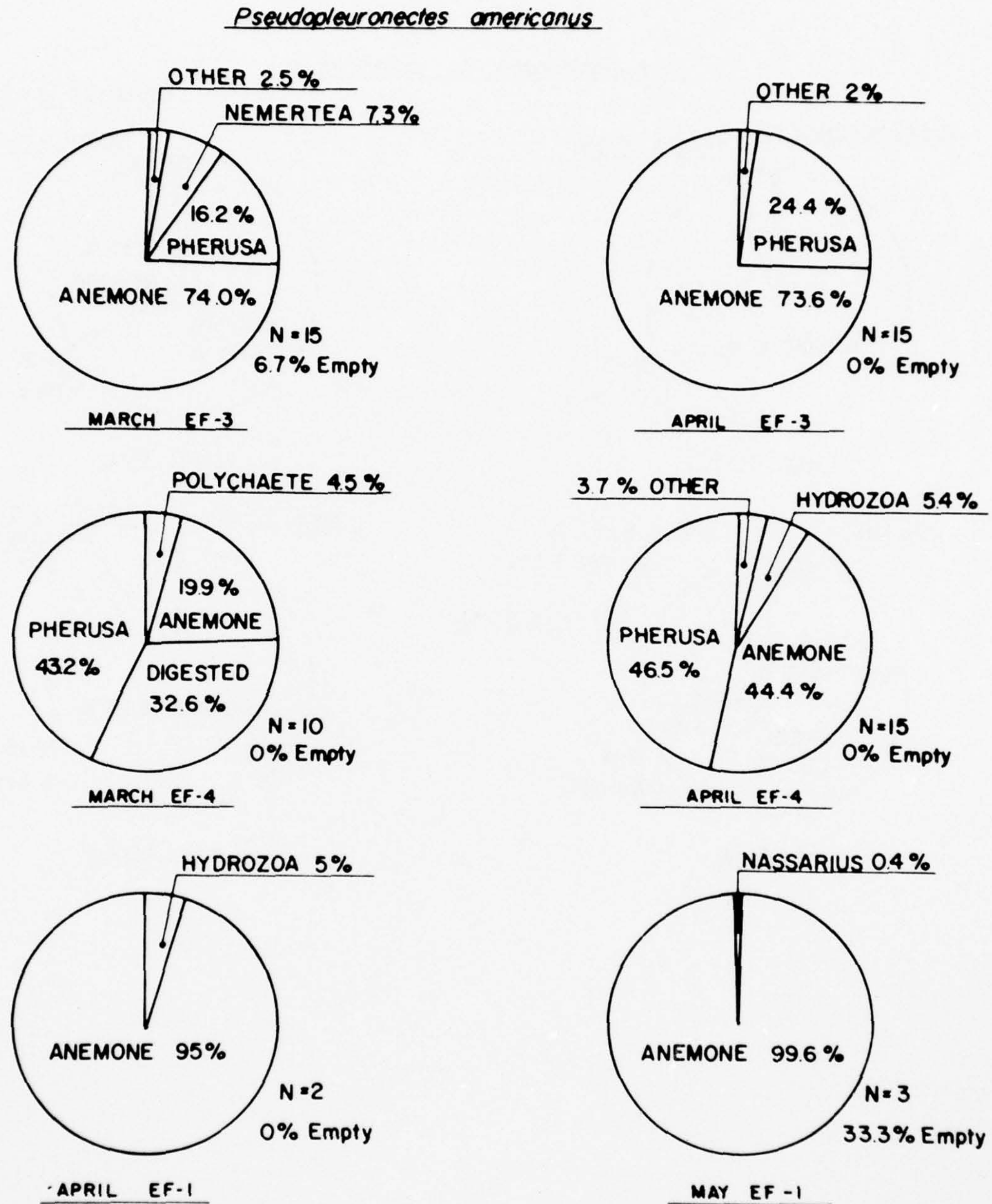


Figure D15 (continued). Identification and percent by weight of stomach contents of winter flounder caught trawling at Eatons Neck stations



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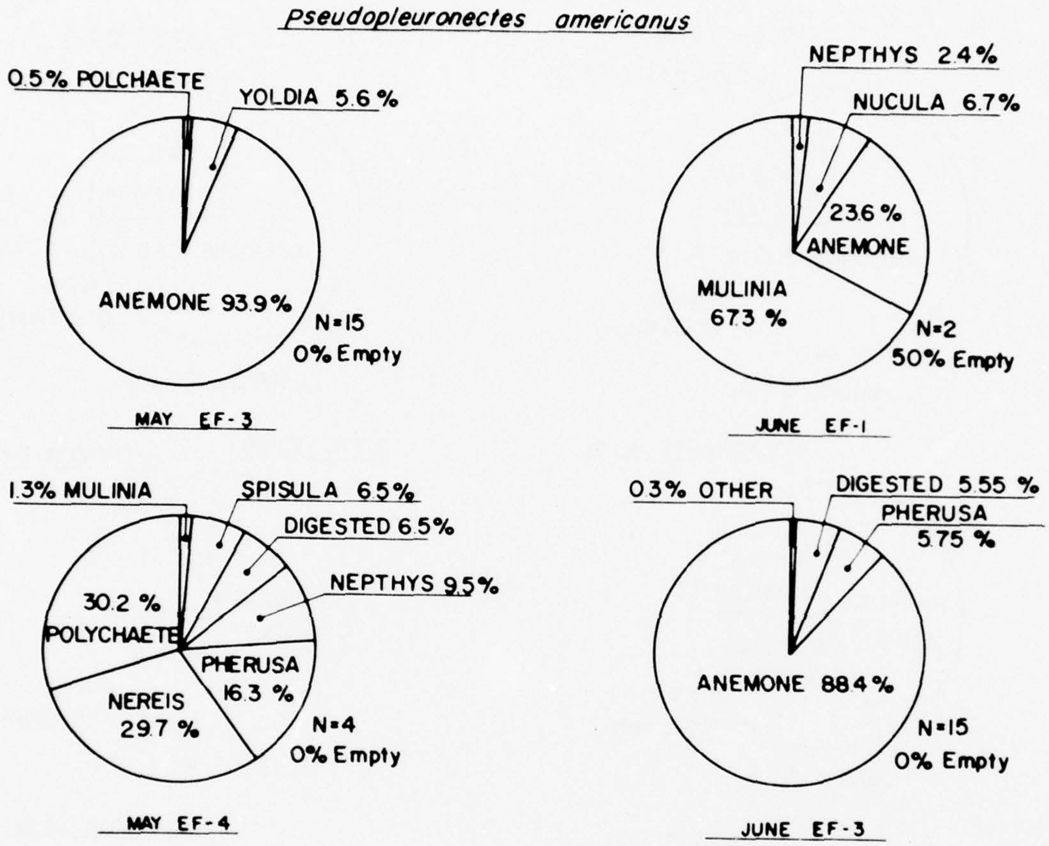

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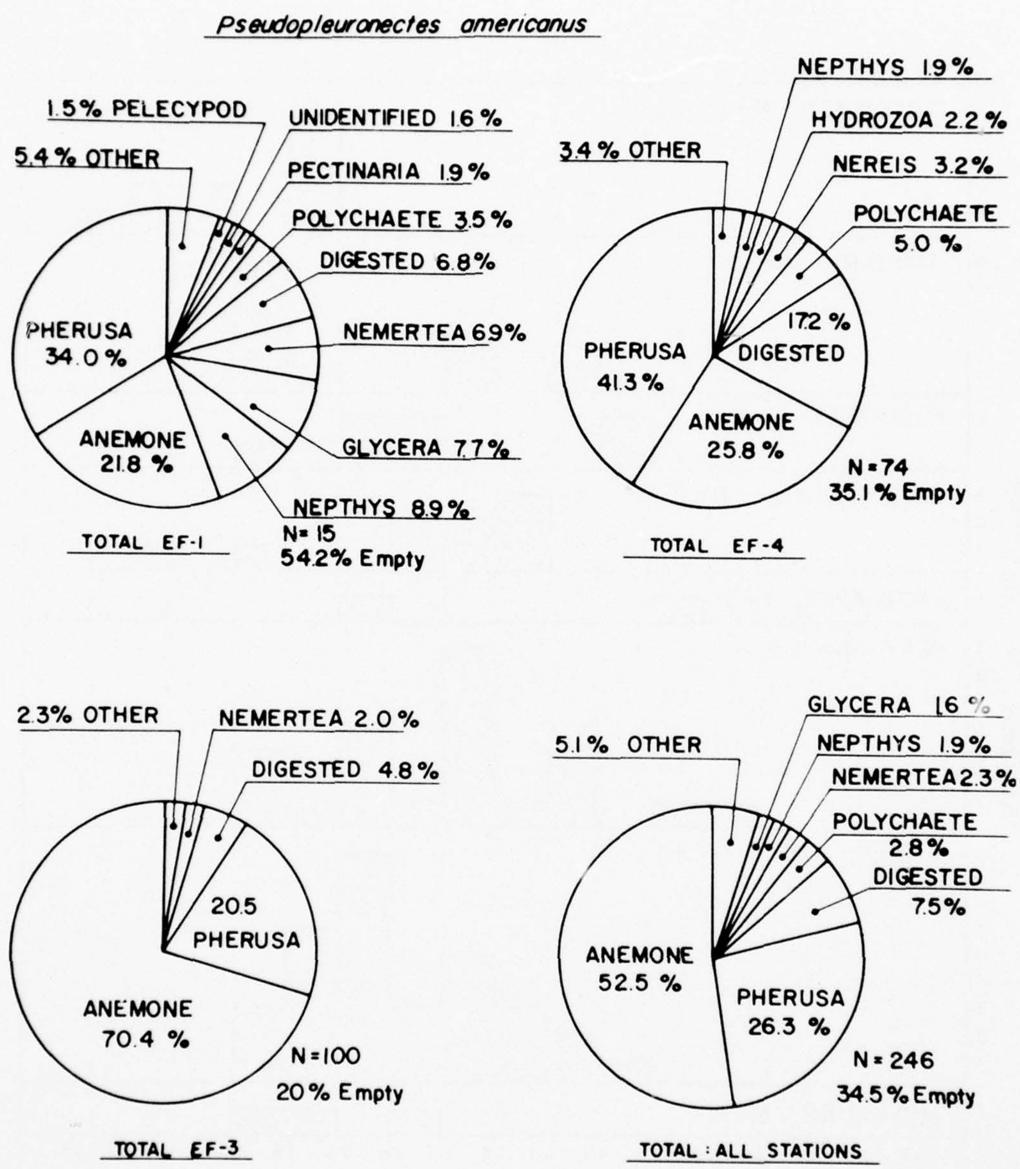

Figure D15 (concluded). Identification and percent by weight of stomach contents of winter flounder caught trawling at Eatons Neck stations

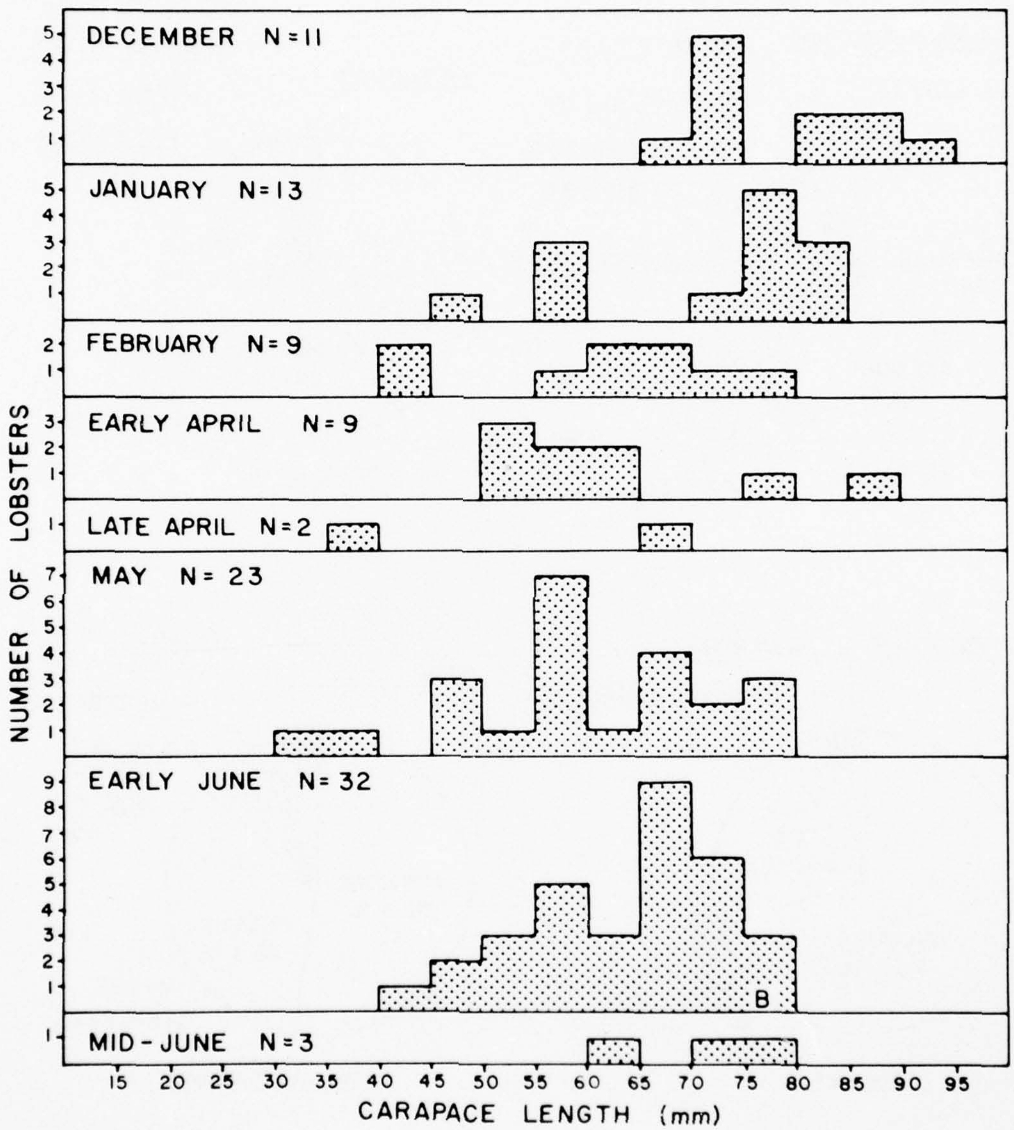

Figure D16. Monthly carapace length frequencies of lobsters caught trawling at Eatons Neck, station EF-1

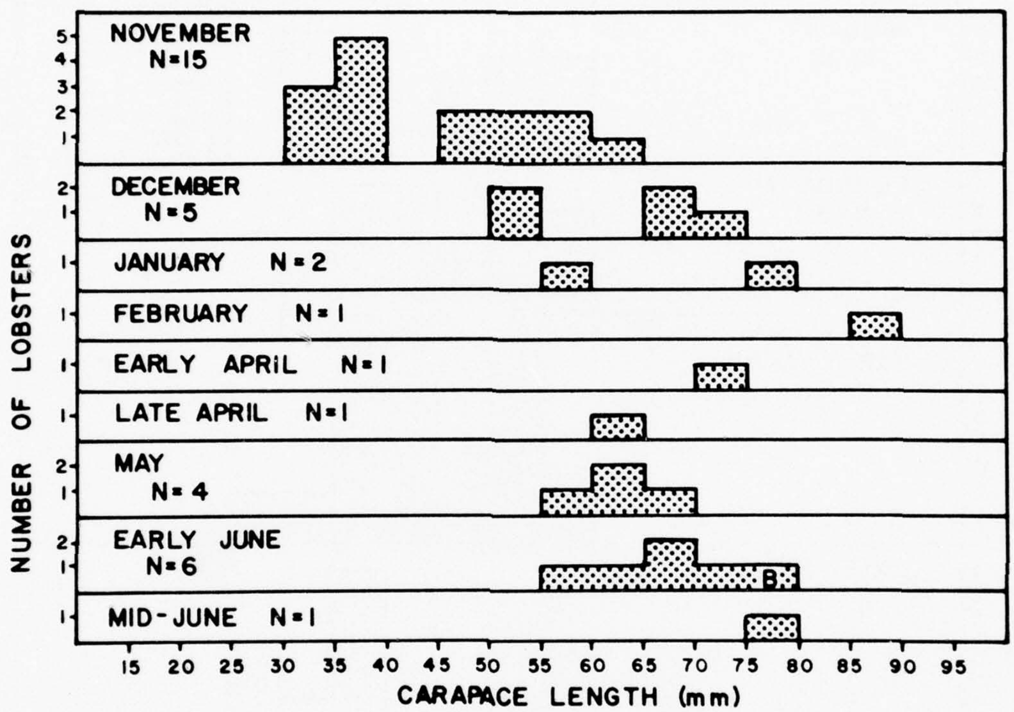

Figure D17 Monthly carapace length frequencies of lobsters caught trawling at Eatons Neck, station EF-3

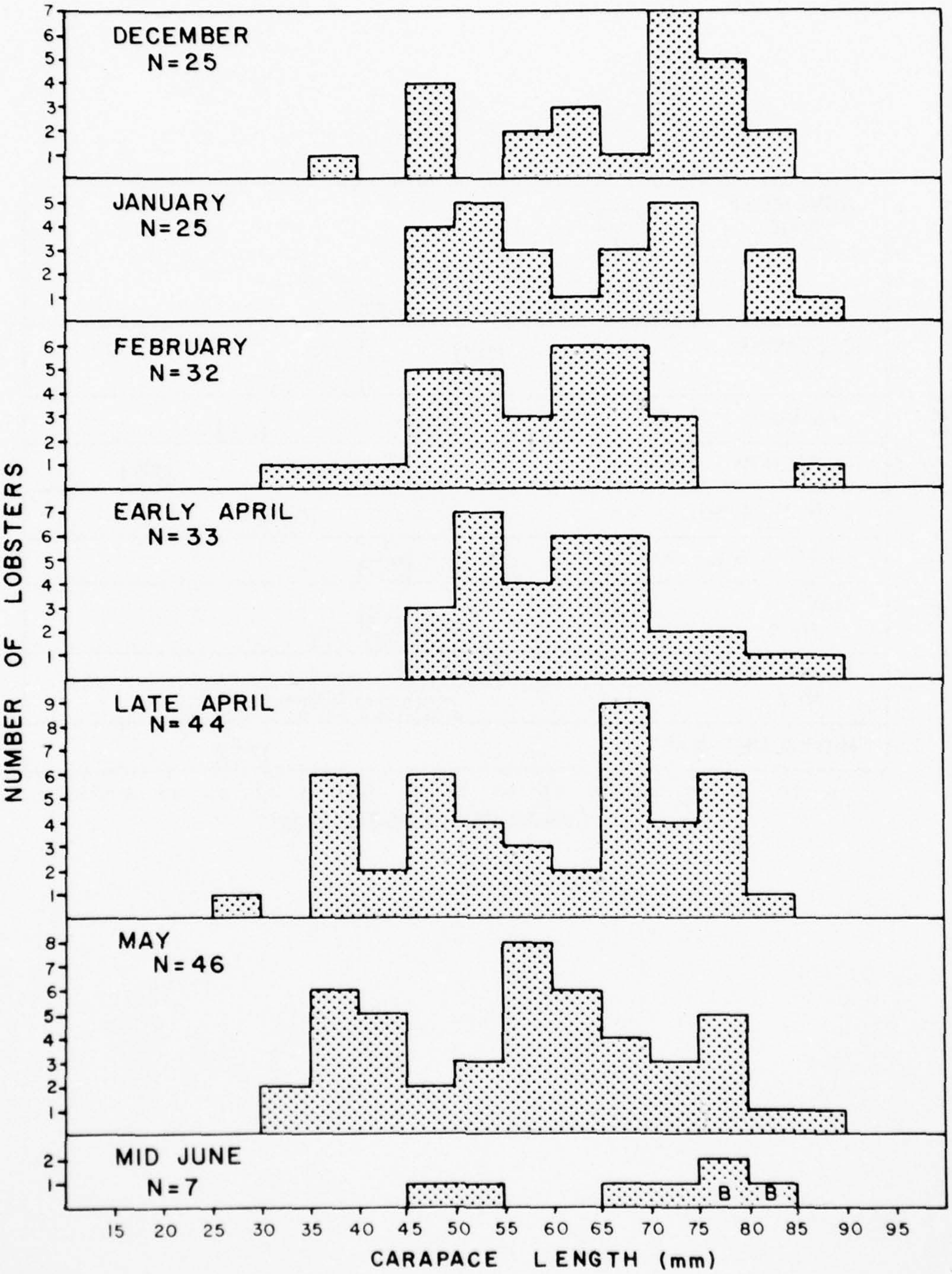

Figure D18. Monthly carapace length frequencies of lobsters caught trawling at Eatons Neck, station EF-4

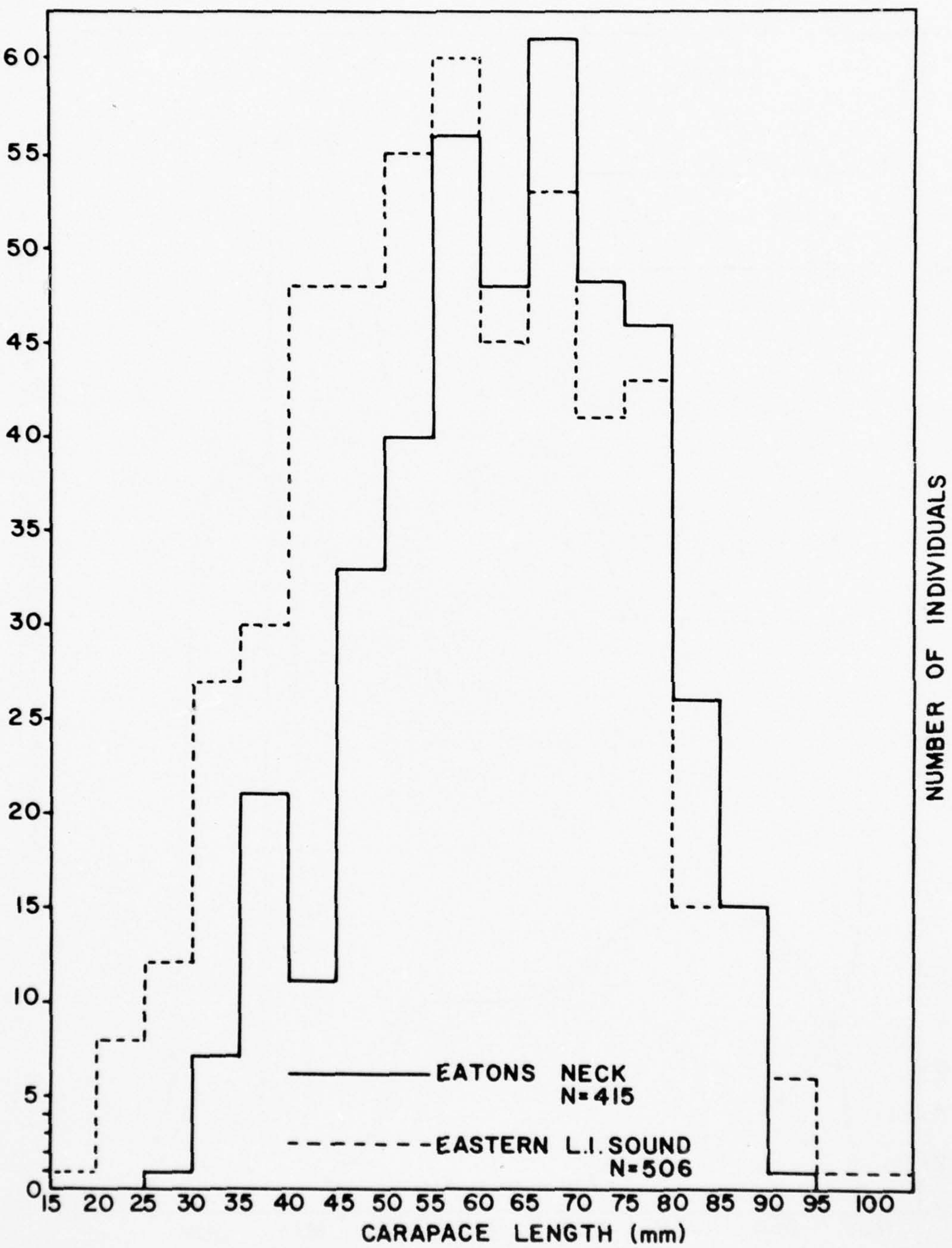

Figure D19. Overall comparison of size structure of lobster populations from the Eatons Neck study and a lobster population study done on eastern Long Island Sound

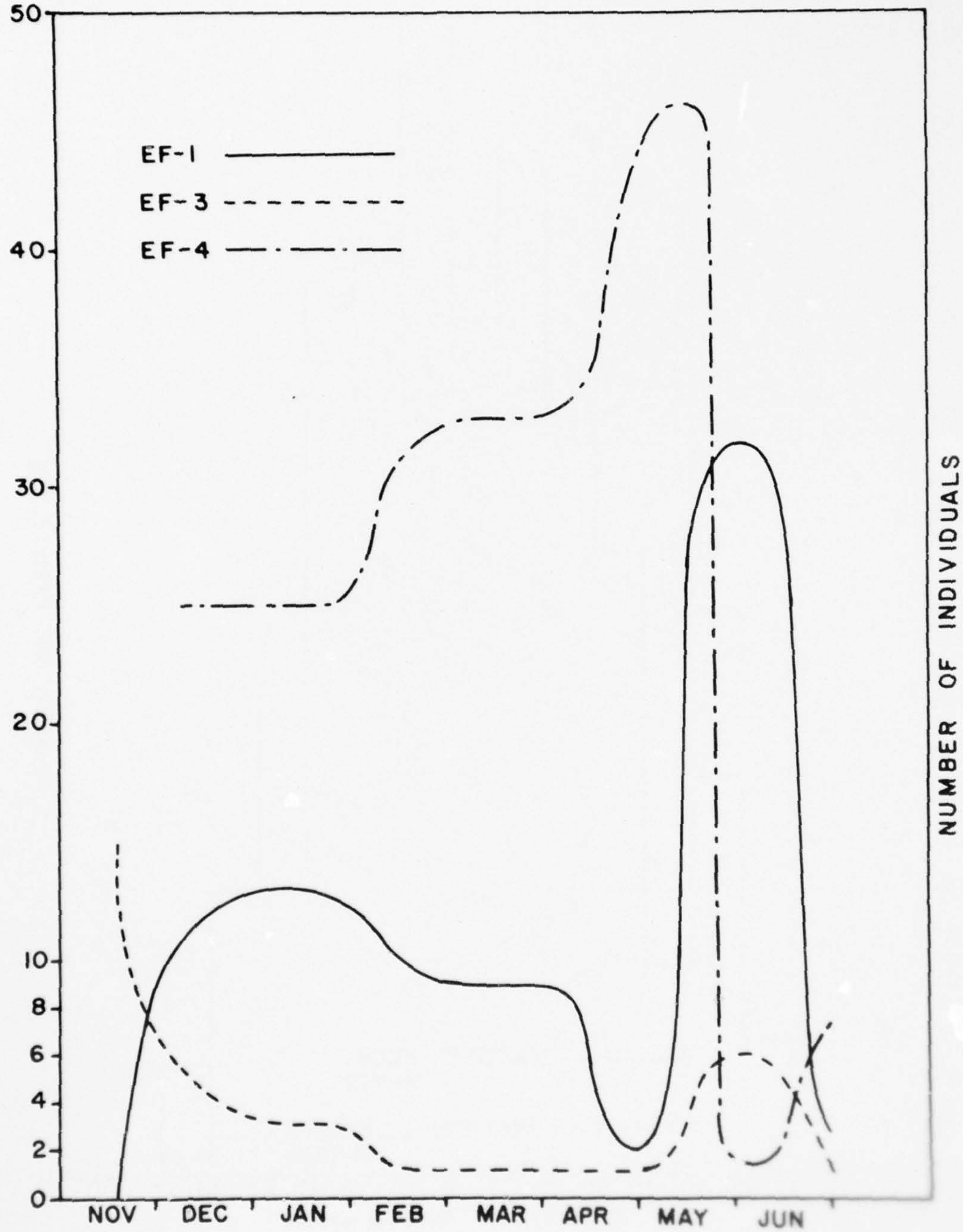

Figure D20. Temporal abundance of lobsters at Eatons Neck stations

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AQUATIC DISPOSAL FIELD INVESTIGATIONS EATONS NECK DISPOSAL SITE--ETC(U)
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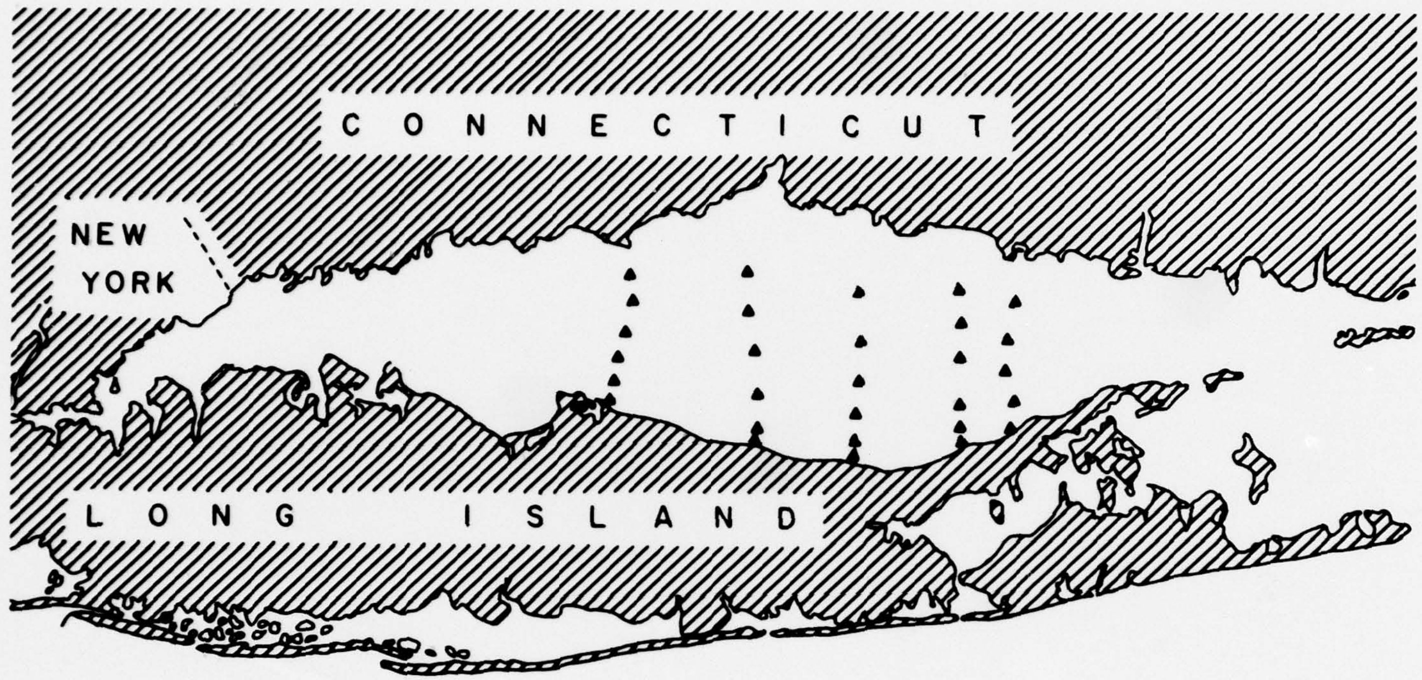

Figure D21. Station locations of an eastern Long Island Sound lobster study done by the New York Ocean Science Laboratory

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Valenti, Robert J
Aquatic disposal field investigations, Eatons Neck disposal site, Long Island Sound; Appendix D: Predisposal baseline conditions of demersal fish assemblages / by Robert J. Valenti and Stephen Peters, New York Ocean Science Laboratory, Montauk, New York. Vicksburg, Miss. : U. S. Waterways Experiment Station, 1977.
35, [56] p. : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; D-77-6, Appendix D)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Contract No. DACW51-75-C-0016 (DMRP Work Unit 1A06C)
Bibliography: p. 33-35.

1. Benthic fauna. 2. Disposal areas. 3. Dredged material disposal. 4. Eatons Neck disposal site. 5. Field investigations. 6. Fisheries. 7. Fishes. 8. Sampling. 9. Waste water disposal. 10. Water quality. I. Peters, Stephens, joint author. II. New York Ocean Science Laboratory. III. United States. Army. Corps of Engineers. IV. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; D-77-6, Appendix D.
TA7.W34 no.D-77-6 Appendix D